Public Water System Supervision
"As Is" Business Process Analysis for Compliance Reporting

EP904T1-A

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Executive Summary

The U.S. Environmental Protection Agency (EPA) is considering alternatives, including Web forms and electronic data interchange, for implementing electronic reporting technologies. EPA's goals include reducing the burden of reporting requirements and improving data quality. To implement data standards and electronic reporting, the agency is developing the central receiving (CR) facility. The CR facility is a central point that supplements EPA reporting systems by performing current and new functions for receiving, which includes consolidating and integrating, legally acceptable data in various formats (e.g., electronic, paper, diskette).

To develop a viable "to be" CR design, the EPA is identifying and documenting current process flows and functional requirements of four compliance reporting programs: Public Water System Supervision (PWSS), Aerometric Information Retrieval System and National Emission Trends System, National Pollutant Discharge Elimination System, and Toxic Release Inventory System. The analysis of the four programs will be used as a baseline of current operations and procedures to develop the CR functional requirements. This report records the processing of data related to PWSS.

The Clean Water Act Amendments of 1996 require that the EPA oversee national water-quality standards for public water systems (PWS) that service small to large communities. The EPA established criteria for delegating authority to states to oversee implementing state PWSS programs. The PWS must monitor and submit reports about the presence and concentration of selected analytes that the EPA and their states have determined to be public health hazards. Reports are sent to the state, or EPA region, if the PWS is operating in a non-delegated state, according to a schedule that matches the PWS's operational profile. EPA requires states and regions to forward data to the Safe Drinking Water Information System/Federal (SDWIS/FED), the EPA's national information system for PWSS management. An extraction of the SDWIS/FED data is sent to EnviroFacts and then to the National Contaminant Occurrence Database, where the data is accessible to the public.

The Logistics Management Institute analyzed the business process of the "as is" data flow and functional requirements for the PWSS program, specifically the submission of sample results data. We analyzed the process according to the roles of four primary PWSS stakeholders—PWS, their contracted laboratories, states, EPA regions, and EPA federal entities. For each stakeholder, we considered the following eight process and support activities:

- *Program management* consists of administering the program (except for functional activities) plus developing and delivering training, guidance documents, and quality assurance and control manuals for the Permit Compliance System.

- *Mail receipt* consists of stamping, logging, distributing, and sorting submissions or received mail.

- *Data capture* consists of entering data into an information system.

- *Data reconciliation* consists of identifying and correcting errors—without contacting the facility.

- *Data archive* consists of maintaining current and historical documents in a database and physical files.

- *Data distribution* consists of generating discharge monitoring report forms and internal and external reports (e.g., quarterly noncompliance, edit, audit, Freedom of Information Act, query, legislative).

- *Information system* consists of hardware; software; and programming and related operation and maintenance, including training, modernization, and system upgrade, user support (hotline), and documents and guides.

- *Compliance and enforcement* consist of compliance reviews of facility reporting, monitoring, inspections, and enforcement actions for evaluating or pursuing legal action.

The PWSS program is as an example of a nearly full delegated reporting program in which the PWS report to EPA regions or delegated states in which the PWS are located. More than 170,000 PWS report through a variety of paper and electronic processes that are determined by the state's and the PWS's or their lab's electronic reporting capabilities. Identifying the common functional requirements for the processing and communicating used by stakeholders in the PWSS program is essential for building a viable "to be" CR model.

Contents

FIGURES

TABLES

Chapter 1
Introduction

The U.S. Environmental Protection Agency (EPA) has issued the Reinventing Environmental Information Plan, or REI Plan, to guide the agency's efforts for improving its operating procedures and reducing the reporting burden on the regulated community. The REI Plan seeks opportunities for the regulated community to submit environmental compliance reports electronically. EPA is evaluating electronic reporting options for its large report-collection systems.

One EPA effort is to evaluate electronic reporting for common environmental reporting models. This report and its companion reports contain our analysis of EPA's reporting systems comprising the following four common models:

- *Non-delegated.* The Toxic Release Inventory (TRI) program provides a model for systems where EPA maintains primacy—it has jurisdiction and sets regulatory requirements.
- *Mixed delegation.* The National Pollutant Discharge Elimination System (NPDES) program is largely delegated to the states. The NPDES data collection is a model for systems with mixed regional and state primacy.
- *Full delegation.* The Emission Inventory Improvement Program (EIIP) requires reporting of Clean Air Act-related data for which all states have authority for managing their data collection.
- *Nearly full delegation, complex.* The Public Water System Supervision (PWSS) program is a model of a complex reporting structure with states, localities, public water suppliers, and testing laboratories collecting, analyzing, and reporting data.

Our report describes the PWSS program as a model for a complex, delegated reporting system. The EPA and its stakeholders will evaluate the process described in this report to assess the ability of electronic reporting to assist in collecting environmental data and managing programs of this type.

PURPOSE

The EPA tasked the Logistics Management Institute (LMI) to document the "as is" data process for the PWSS program. In this report, we define a common "as is" process for compliance reports submitted to delegated states and regions by public water systems (PWS) or the laboratories that analyze water samples. We also detail the processing of data transferred from state and regional information

systems to the EPA national system, Safe Drinking Water Information System/Federal (SDWIS/FED). Our analysis includes, in a separate volume, cost estimations of the "as is" process that can be compared to future electronic reporting options.

An analysis of future electronic reporting options is not part of this study, but the options will be described in a forthcoming report that considers all four "as is" reporting models.

PUBLIC WATER SYSTEM COMPLIANCE REPORTING

The PWSS program implements the Safe Drinking Water Act. EPA's Office of Ground Water and Drinking Water (OGWDW) manages the PWSS program at the national level. Primacy for the program is mostly delegated to State agencies. EPA regions monitor water systems in Wyoming and on tribal lands.

All water systems that meet the definition of a PWS have to monitor and report on contaminants. The EPA definition of a PWS is a supply that provides piped water for human consumption and serves at least 25 persons or has at least 15 service connections. A PWS can be a community water system, a non-transient non-community water system, or a transient non-community water system. PWS are classified by how often each water system must report and the system's operational contaminant limits. The majority of PWS are small operators. However, large PWS serve approximately 80 percent of the population.

METHODOLOGY

In preparing this study for the EPA, LMI staff interviewed representatives from five states (Arizona, California, Indiana, Missouri, and Texas), two EPA regions (Region 6 and 8), and EPA headquarters (HQ). The representatives were from several program offices, including water, information management, enforcement, compliance, and permitting. The representatives were technical specialists, data control staff, and program managers. In Arizona, Indiana, Missouri, and Texas, LMI met with PWS and certified laboratories that analyze samples for PWS. We developed a set of questionnaires with help from EPA—one each for PWS, laboratories, states, regions, and EPA HQ. When possible, we distributed the questionnaires before we visited to improve the efficiency of the information gathering.

EPA selected the states and regions as representative of a variety of reporting environments. Arizona volunteered to be included after some of their PWS requested being considered for electronic reporting.

In addition to interviews, LMI used procedure manuals, data specifications, system reports, system outputs, and other system documentation that EPA gave us to develop a conceptual understanding of the PWSS compliance reporting.

REPORT ORGANIZATION

This report is divided into six parts—four parts describe a specific stakeholder's role in the PWSS program. The parts are Part I, Introduction; Part II, Facility; Part III, State; Part IV, Region; and Part V, Federal. We describe the PWSS process for each of the stakeholders, in the chapters described.

- *Chapter 1, Process Overview*. This chapter describes the core and supporting functions of PWSS and is an overview of the PWSS data process.
- *Chapter 2, Program Management*. The PWSS program management oversees the operational and administration. Program management integrates policy with the data processing of the PWSS program. Programs include assistance and outreach to promote compliance.
- *Chapter 3, Mail Receipt.* The mail receipt function prepares mail pieces for data processing.
- *Chapter 4, Data Capture.* The data are captured by entering the "as submitted" sampling information into a database.
- *Chapter 5, Data Reconciliation.* The data reconciliation function reviews and reconciles data as submitted. The data are reconciled to eliminate duplication, resolve discrepancies and inconsistencies, and eliminate errors.
- *Chapter 6, Data Archiving*. The submission tracking and storage function ensures that original submissions are retained for the required period.
- *Chapter 7, Data Distribution.* The data captured by states and EPA regions provide information for evaluating the programs' efforts. The data are also available to the public, and EPA HQ releases data from SDWIS/FED to Envirofacts, a data warehouse available for public and private use.
- *Chapter 8, Information System*. The EPA and states use information systems to support data processing and as a tool for collecting, organizing, and reporting sampling data.
- *Chapter 9, Compliance Monitoring and Enforcement.* The purpose of the compliance and enforcement function is to ensure that facilities meet reporting requirements and report their sample analysis accurately.
- *Appendices*. The appendices contain supplemental information.

Chapter 2
PWSS Stakeholders

This chapter is an overview of the key stakeholders in the PWSS reporting process. The functions of each stakeholder are described in parts II, III, IV, and V.

PWSS reporting is developed and maintained by the stakeholders: facilities (and laboratories), state PWSS programs, EPA regions, and federal (i.e., EPA headquarters). PWSS data are widely used by the public; the media; other EPA program offices; state, local, and tribal government; environmental and industry advocacy groups; researchers; and the business community.

FACILITY

Facilities and laboratories prepare and, in some cases, the laboratories submit results of sampling data to PWS. Part II describes the activities of the PWS and the laboratories in capturing and reporting compliance data to primacy agencies.

STATE

All states except Wyoming have primacy over its PWSS program. The programs identify the PWS that need to report to them, schedule sampling, capture reported data, and encourage PWS compliance.

REGION

Regions are the primacy agency for PWS operating on tribal lands, and Region 8 operates the PWSS program for Wyoming. Regions also oversee primacy states by reviewing compliance data and assisting in enforcement.

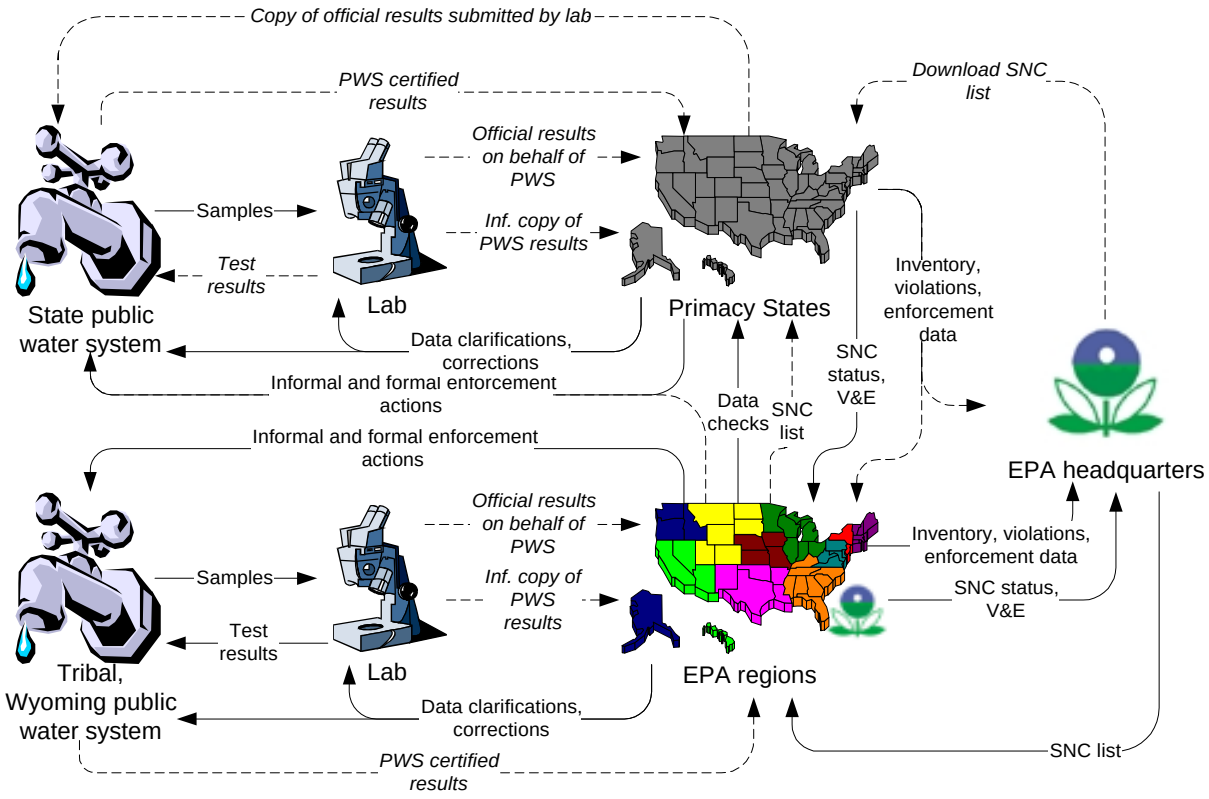
FEDERAL

EPA's Office of Ground Water and Drinking Water is the agency's lead in developing national policies for the PWSS program. OGWDW maintains the national information system for PWS compliance data, SDWIS/FED. OGWDW uses the data to develop policies and measure the EPA's goals.

REPORTING

Figure I-2-1 shows the flow of high-level data from PWSS submissions and related activities.

Figure I-2-1. Flow of High-Level Data



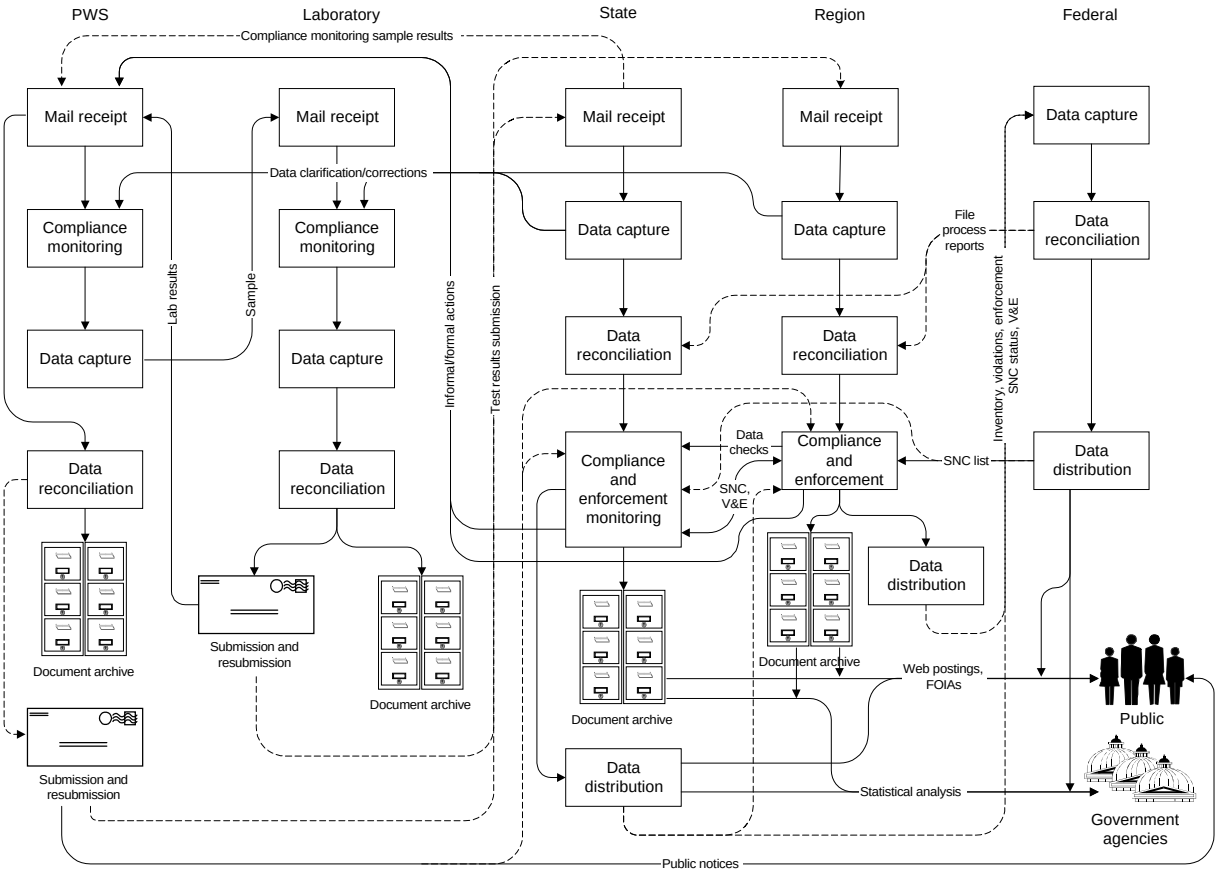
Note: SNC = Significant Non-Compliance, V&E = Variance and Exceptions.

The PWSS program uses a self-monitoring process. The PWS arrange for certified laboratories to test samples and send the results to primacy agencies. The primacy agencies in turn capture the sampling results in an information system and forward a summary of the results that exceed permitted levels to SDWIS/FED quarterly.

Developing a process flow for such a complex system is a challenge. The PWS, labs, and primacy agencies can be flexible in designing the process for collecting the sampling data. Nevertheless, we used information gathered from a sampling of stakeholders to develop a generic flow for the processing of PWSS data.

Figure I-2-2 depicts PWSS reporting. We refer to the figure throughout this report as we examine the pieces more closely. In addition to the functions specifically depicted in Figure I-2-2, we discuss the relationships of program management and information systems that affect the other functions.

Figure I-2-2. Overview of PWSS Reporting



Part I

Introduction

Chapter 1
Facility Process Overview

Part II describes the process for meeting the reporting burden placed on a Public Water System. According to federal regulations, the PWS is responsible for sending the primacy agency the results of sampling for contaminants. Some states with primacy, however, require the certified lab to report monitoring results instead of the PWS. Some PWS operate a laboratory for operational and compliance purposes. However, many small and medium water systems rely on contracted laboratories not only to test the samples, but also to verify the results. To better understand the relationships of PWS and laboratories, we discuss both process flows in this part.

We asked some of the primacy agencies in Indiana, Missouri, and Texas to arrange for water systems and certified labs to meet with us. The PWS we talked with ranged from small to large community water systems. We spoke with two water systems that operated a certified lab and we spoke with three state primary labs.

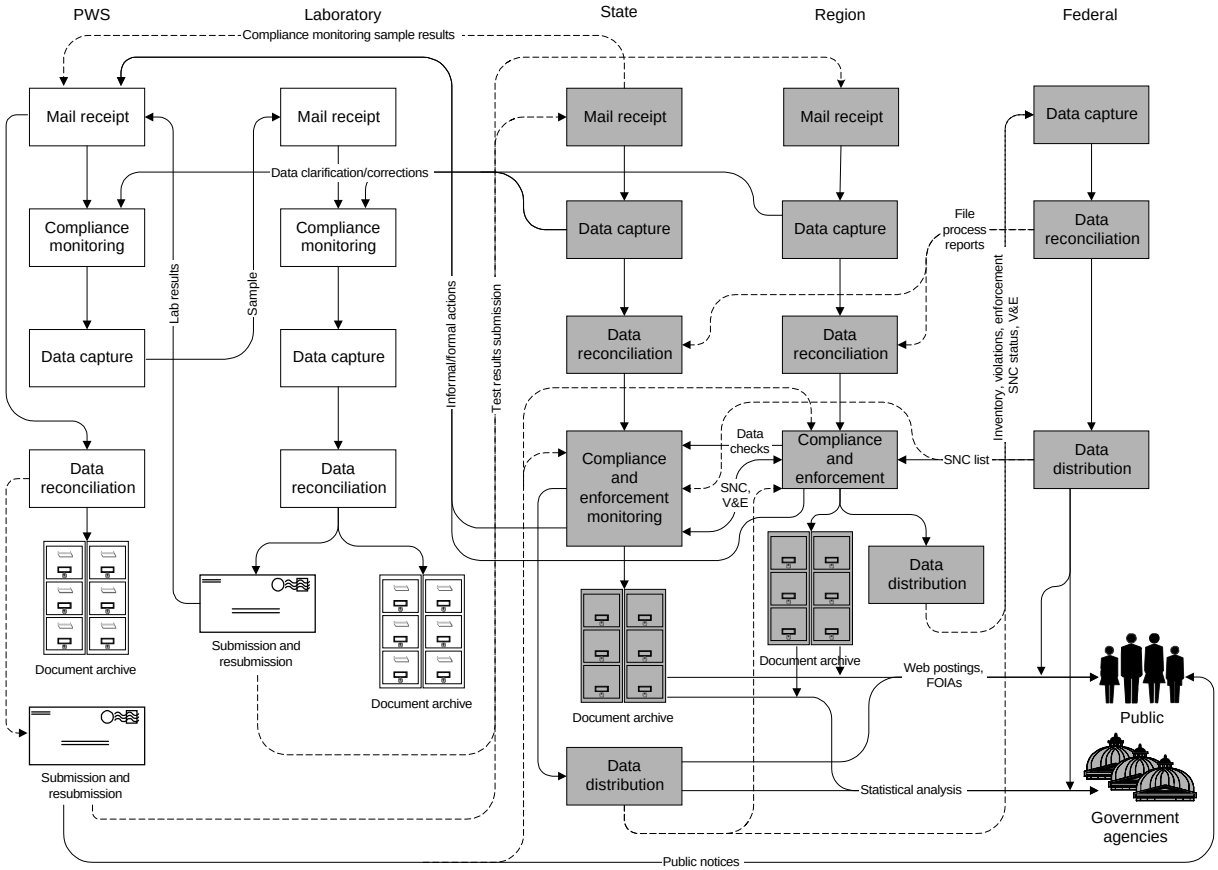
We learned from the water systems and the labs about the various combinations of PWS and lab relationships. PWS may operate a certified laboratory for analyzing water or they may use an external laboratory to process and analyze samples. A PWS also may contract for samples to be collected in addition to having the samples analyzed. Regardless of whether in-house laboratories or contractors do the sampling and analysis,, the processing of samples is relatively similar. The non-shaded area of Figure II-1-1 represents the facility reporting process. We have attempted to capture potential options in this flow that will be discussed in detail in the following chapters.

The data flow typically requires the following:

- collecting a sample and recording the event,
- conveying the sample to a lab,
- analyzing the sample and capturing the results,
- sending the analysis back to the PWS, and
- in some states, sending results to the primacy agency.

When a lab detects contaminants above maximum contaminant levels in a sample they must notify the primacy agency or the water system within 24 hours.

Figure II-1-1. Overview of Facility Process



PWS

More than 170,000 water systems are active. PWS are classified into one of three types. The size classification varies by rule. Table II-1-1 describes PWS types and general size classifications. The type of water system determines which contaminants the system must test for. In combination with the type of system, the size of the system may affect the number and frequency of sampling.

Table II-1-1. Water System Classifications by Type and Size

Types of water systems	Size classifications
Community water system: serves at least 25 people or 15 connections year round	*Small:* serves 25 to 3,300 people
Non-transient non-community: serves at least 25 of the same people for more than six months of the year	*Medium:* serves 3,301 to 10,000 people
Transient non-community: serves at least 25 people, though not the same, for more than six months of the year	*Large:* serves more than 10,000 people

Community water systems often support their operations by sampling beyond that required by regulations. Operational sampling may be done in real time by automated equipment or through routine collecting. However, sampling to comply with PWSS regulations typically requires that an individual with a sample-collection kit retrieve samples from selected locations at certain times throughout the day, week, month, or year. One water system indicated that regulatory compliance sampling accounts for ten percent of their total sample collection and analysis.

Non-transient and transient non-community water systems may be characterized by schools or hotels, respectively, that have their own water source. The operators of these types of systems most likely sample strictly for compliance testing. Sampling is only required for the period that the water system is actively used. For example, a campground with an independent water source would not have to continue monitoring if it shuts down for the winter.

The water system's type, size, and source determine whether sampling is required weekly, monthly, quarterly, or biannually in accordance with a particular contaminant rule or group. According to federal regulations, sampling results are due to the primacy agency within ten days of the month after they are received at the PWS. An obligation to report monthly is most common for meeting microbiological sampling requirements. Primacy agencies process an estimated 4,157,000[1] submissions each year. This number represents an average of 24 submissions per PWS.

LABORATORY

The laboratories, whether in-house or external, may be certified by EPA or the state to perform certain analyses or sets of analyses. For example, a lab may be certified to test for lead and copper but not for analyzing for coliform. The primacy agency keeps track of contaminant groups a lab is certified to test for. The labs do not have to be in the same state as the primacy agency or PWS. When certifying, state agencies may recognize the accreditation of labs according to EPA guidelines or the National Environmental Laboratory Accreditation Conference (NELAC). To be accredited and certified by the primacy agency, the lab must prove that its operating procedures ensure reliable results. As an example, the Indianapolis Water Company, which operates a certified laboratory for processing its own and other PWS samples, has a standard operating procedure (SOP) for developing and maintaining its many SOPs to maintain quality and produce reliable results.

Even with a plethora of certified labs to choose from, the principal state laboratories (PSL) process a significant part of the samples for the PWSS program. One reason why PSL analyze so many samples may be that although some PSL charge

[1] Information collection request for the Public Water System Supervision Program, 1997.

a per-sample fee, they may be subsidized for testing drinking water samples because sampling is mandatory for the water systems.

Ninety percent of microbiological samples from Missouri PWS are sent through the State Department of Health laboratory, the PSL for Missouri. In Texas, the State Department of Health also processes a large percentage of the samples reported to the state primacy agency. A query of the Indiana Department of Environmental Management's information system shows that the Indiana State Health Department laboratory processed about 25 percent of the more than 57,000 samples submitted by the state's PWS in 1998. The next highest volume processed by a single lab was nearly eleven percent of samples. The Indianapolis Water Company lab processed slightly less than one percent of all the compliance samples for the State of Indiana.

Chapter 2
Facility Program Management

PURPOSE

The purpose of facility program management is to ensure that the requirements of the PWSS program for compliance monitoring are followed.

DESCRIPTION

Program management ensures that samples are collected and tested, the test results are reported on schedule, records are kept, and entities are informed according to internal SOPs and PWSS requirements.

PWS

The PWS's involvement in the compliance process may be extensive or very limited. Some factors that determine the extent of PWS's involvement are:

- Does the PWS operate a lab to perform its own compliance testing?
- When using contracted lab services, does the PWS collect the samples?
- Does the primacy agency allow external labs to submit sample results on behalf of a PWS?

Under federal regulations, the PWS is legally responsible for making sure the primacy agency receives the lab results on time, as well as for the accuracy and completeness of the results. The PWS is required to maintain compliance records on site.

A challenge for the smallest systems is understanding the reporting requirements. In some instances, a small PWS (e.g., a gas station, or even a rural community) may have difficulty maintaining a certified operator. In these situations, the primacy agency may assist or permit labs to assist in collecting and reporting results.

Laboratory

All laboratories interested in serving PWS must maintain their certifications. EPA certifies a laboratory for analyzing samples for specific contaminants that must be reported to each primacy agency. Often, the lab certified by EPA is a state-operated lab, such as one in a state public health department. The laboratory, in turn,

certifies all other labs that would submit results to the primacy agency. To remain current about compliance requirements, PWS and laboratory personnel may attend informational and certification workshops offered by some primacy agencies.

Chapter 3
Facility Mail Receipt

PURPOSE

The facility mail receipt ensures that incoming mail, which may contain sample containers, results, and notifications, is received and processed through to responsible personnel according to internal policies.

DESCRIPTION

PWS

PWS receive hard copies of analytical results through the mail. The PWS generally do not send the labs an acknowledgment when they receive results through the mail. A date stamp may be applied to record date of receipt. The analytical results are routed to an operator or official for their review.

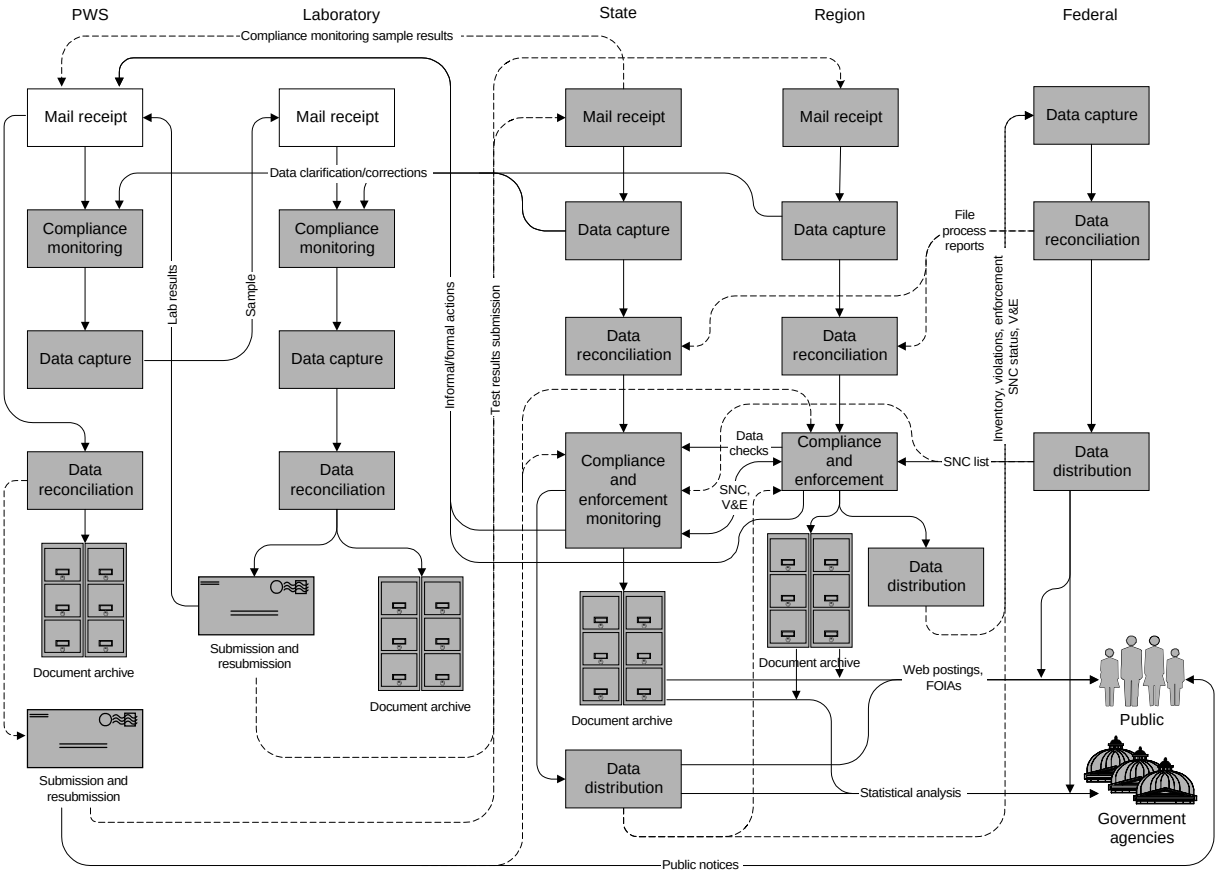
The PWS, in addition to receiving copies of the laboratory results, may be notified of actions brought by the primacy agency because of the data. The facility's official for PWSS compliance monitoring receives the notification of actions. Figure II-3-1 shows the flows through a PWS's mail receipt.

Laboratory

When the lab receives samples from a PWS, they generally log the receipt of the samples. The lab typically gives the PWS the sample containers with labels affixed. The lab generates the labels by computer or hand to track the sample when it is received. The samples are tracked by using hand-written logs or an electronic laboratory information management system (LIMS). The labs typically receive and process the samples in batches of no more than 20, which may be reflected in the tracking system.

Even when the lab collects the sample for the PWS, the lab logs the sample in a similar manner. The same is true of a lab operated by the PWS.

Figure II-3-1. Facility Mail Receipt in Overall Process



Chapter 4
Facility Data Capture

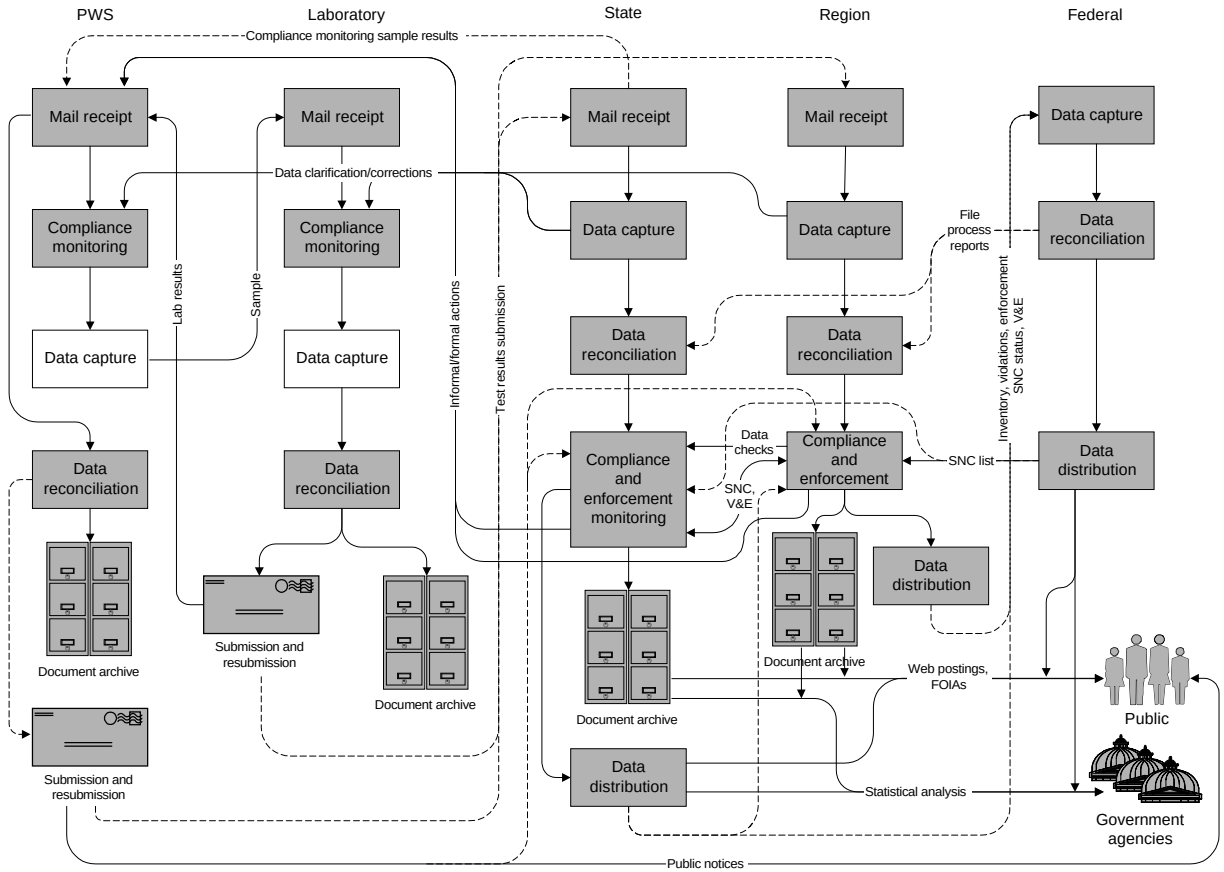
PURPOSE

The purpose of the facility data capture is to record all pertinent data, including water sampling data and analytical results according to the internal policies and regulatory requirements.

DESCRIPTION

Figure II-4-1 shows how facility's data capture fits in with the PWSS. The data capture for the facility are shown in non-shaded boxes in the figure.

Figure II-4-1. Facility Data Capture in Overall Process



PWS

The PWS or a contractor typically captures the following data: sampler's name and affiliation, the sampling location, a sample number, and the date the sample was collected. For external lab work, the PWS name or identification is recorded. The number of samples collected varies by the population served, source water, and system type. The number can range from ten samples per month for a small groundwater source to several hundred for a large surface-water community water system (CWS).

Laboratory

The laboratory analyzes the sample for a particular contaminant or suite of contaminants. The results are recorded on a lab slip. The slip identifies the PWS, the sampling location and number, date and times of sample collection and analysis, contaminant tested for and the observed results. The technician may enter the information into the system by hand or send it electronically from the testing equipment. After entering the information, the laboratory technician signs the lab slip.

In addition to sampling data, the lab records their spike tests in logs or in their information system. Although spike tests are required for quality assurance, the results do not have to be sent to the PWS or the primacy agency.

Chapter 5
Facility Data Reconciliation

PURPOSE

The facility data reconciliation verifies data and corrects potential errors in recorded compliance data according to internal policies and regulatory requirements.

DESCRIPTION

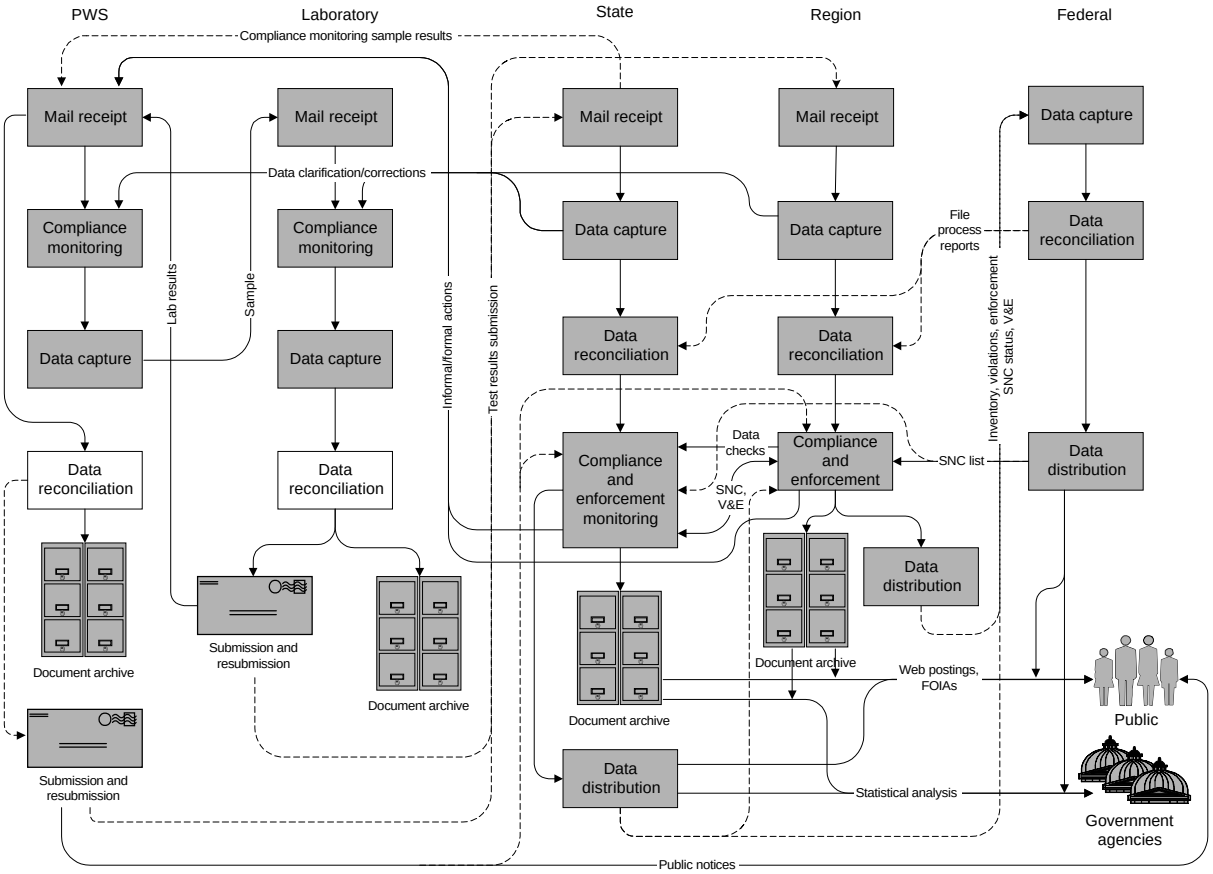
PWS

The PWS's regulatory responsibility is to send accurate and complete results to the primacy agency. During our study, we found that labs generally are trusted to have performed their tests correctly and their submissions are not questioned, even when the PWS sends the official results to the primacy agency. However, Indiana requires that all PWS certify that they have received and agree with the results in order for the results to be official. Figure II-5-1 depicts the data reconciliation in the overall process. Data reconciliation is shown as non-shaded boxes in the figure.

Laboratory

Laboratory procedures determine the level of error checking that a lab does before sending the results to the PWS. Some labs will confirm that the results recorded in a log agree with those in the report that they send. If automated testing equipment records the result to a system that generates the report, a lab technician usually visually scans the results. States typically require that the lab technician sign or initial the report to indicate that they agree with the results.

Figure II-5-1. Facility Data Reconciliation in Overall Process



Chapter 6
Facility Data Archiving

PURPOSE

The facility data archiving facilitates maintaining and storing accurate and timely records of data to comply with internal policies and regulatory retention requirements.

DESCRIPTION

PWS

Regulatory requirements stipulate that PWS are to maintain copies of their compliance data on site. Table II-6-1 represents the minimum federal record-keeping requirements. State and facility policies may be more stringent.

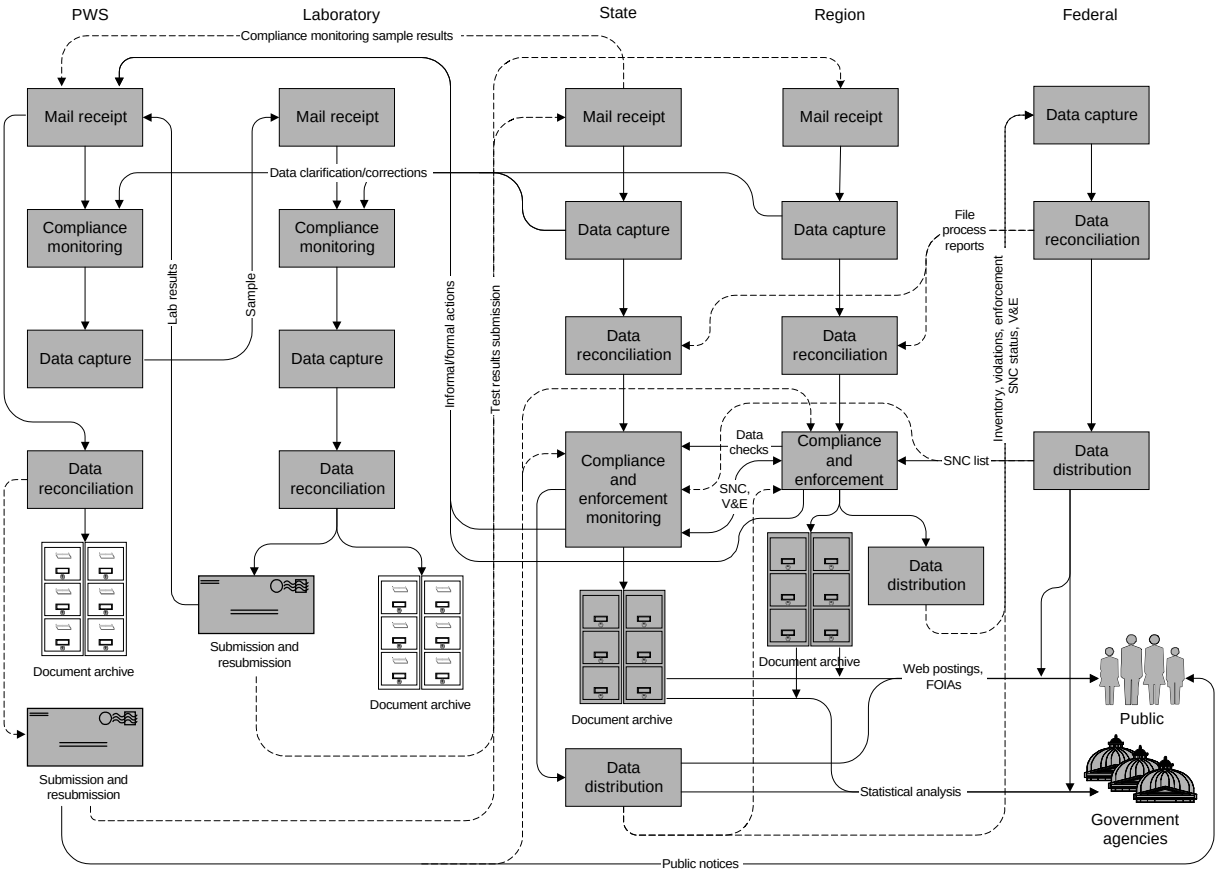
Table II-6-1. Minimum Federal Document Retention Requirements

Documentation	Minimum record retention
Bacteriological results	5 years
Chemical results	10 years
Sanitary surveys	10 years
Variance/exemption records	5 years after V&E expiration
Lead and copper rule	12 years

One small system we visited maintained all their records in notebooks and boxes in the manager's office. One primacy agency expressed its concern for some PWS that need experienced operators and may lack proper record- keeping practices. Figure II-6-1 represents the flows to the facility's document storage in the overall process.

If the PWS contracts duplicate sampling, the water system has the discretion to keep the duplicate results that are not reported.

Figure II-6-1. Facility Tracking and Archiving in Overall Process



Laboratory

The PWSS program does not have policies for laboratories' retention of records. However, labs establish SOPs to better assure high-quality analysis and maintain their certification.

If hard copies are generated, a copy is often archived at the lab. The state labs for Indiana and Missouri indicated they maintain hard copies for five years. The file retrieval system for the Indiana lab is automated and uses a file identification system for locating files by keying in an ID on a keypad. The ID triggers mechanical shelves that cycle until the shelf with the desired file is in front of the requestor.

Chapter 7
Facility Data Distribution

PURPOSE

The facility data distribution process ensures that collected samples and lab results are mailed to the appropriate locations in accordance with internal policies and regulatory requirements.

DESCRIPTION

Federal regulations require that a PWS report to the primacy agency

- the results of sample collections,
- failure to comply with regulations,
- copies of required public notifications, and
- other documentation the primacy agency may call for under the SDWA or state law.

The primacy agency must receive the results of sampling within ten days after the month in which the PWS has them. Sample results are the most numerous and regular of the data outputs and typically are mailed paper forms or lab slips, although some labs do convey results to primacy agencies electronically. A separate report must be sent to the primacy agency for each sample. The national average for sampling is 24 per facility.

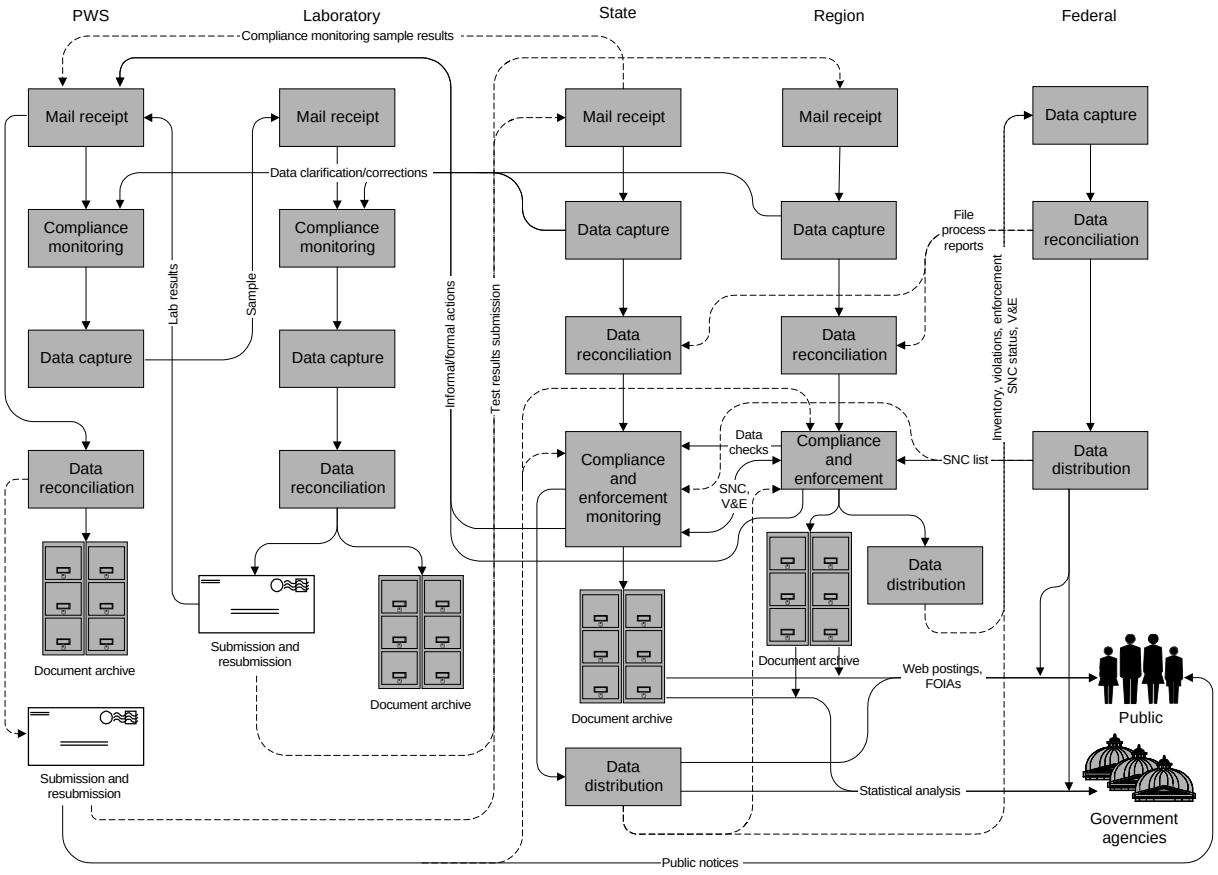
Examples of a PWS failing to comply with regulations are not monitoring according to schedule or detecting unhealthy levels of contaminants. The laboratory must bring the PWS's failure to comply to the primacy agency's attention within 48 hours. The lab that tested the sample must telephone, fax, or email the primacy agency to ensure a rapid notification.

If a PWS fails to meet maximum contaminant levels (MCLs) or minimum treatment standards, they are required to publish a notice to the public. A copy of the notice is to be sent to the primacy agency within ten days of the notice being made public. The PWS may notify the public by advertising in daily or weekly circulars or by distributing flyers or bulletins in conspicuous locations.

A primacy agency typically will request other documentation ad hoc, determining a timeframe case by case. Figure II-7-1 depicts the distribution of data from PWS

and labs. The facility data distribution is shown in the figure in the non-shaded boxes.

Figure II-7-1. Facility Data Distribution in Overall Process



PWS

Some state primacy agencies require the PWS to acknowledge their agreement with lab results before the results are formally submitted by the PWS**.** Federal regulations hold the PWS responsible for reporting their data, with some exceptions if a state lab is used. Submissions do not have to be sent by certified mail, but a PWS usually does not receive an acknowledgement of receipt by another means.

In some cases, a PWS formats the laboratory report form or slip it receives for submitting to the primacy agency. By using this method, the PWS can sign off on the form and submit it. If the PWS uses an external lab and doesn't use the primacy agency's format, the PWS may have to transfer the results to a new form before forwarding them. PWS usually use a new form if it contracts with an external private lab (i.e., not the state lab).

Laboratory

Primacy agencies may allow laboratories to submit either unofficial informational results or official results on behalf of the PWS. The labs may mail hard copies, fax the results, or send electronic files for computer-to-computer transfers.

Commonly, when the laboratory submits official results to a primacy agency they often send a hard copy of the results to the PWS at the same time. Because the PWS is not sending the results, the PWS must contact the primacy agency to confirm that a submission has been received. Another option for confirming receipt of the results is for the primacy agency to send the copy of the results to the PWS, as is done in Missouri.

From our meetings with labs and primacy agencies, we found that the state labs typically could report electronically. Texas receives data electronically from their state lab. Indiana has allowed their state lab to send informational data electronically. States are developing mechanisms to encourage more labs to report electronically. California already receives 85 percent of their submissions electronically from the labs through diskettes, FTP transfers, and email attachments. In the future, California will require all laboratories to report results electronically.

Chapter 8
Facility Information System

PWS

A large PWS that operates its own laboratory, is most likely to maintain an information system to support regulatory requirements. The PWS that have a LIMS may operate their information system separate from their operations. We noted that many community water systems have information systems for monitoring operations from automated equipment located at critical points in the treatment plant. The information is sent continuously to operators so they can adjust the water treatment. Compliance samples are collected from treated water in the distribution system. We did not encounter a PWS that used automated testing equipment for collecting and analyzing compliance samples.

We did not determine the specific types of PWS computer systems. We learned that many community water systems have or expect to have soon a computer that can access the Internet.

LABORATORY

We interviewed a handful of laboratories about their information systems. The state labs have computer systems that can access the Internet. The water systems that operate labs also could access the Internet. Computers with Internet access are external to the equipment used for analyzing, although some analysis equipment is connected to local area networks (LANs).

Some automated testing equipment is available to laboratories that can communicate the results to external applications. The external applications vary from spreadsheets to sophisticated databases. The laboratories we talked with were interested in LIMS for capturing, tracking, and reporting sampling data. LIMS can be expensive and even labs that have automated testing equipment may not be able to afford a LIMS. LIMS can range from tens of thousands to hundreds of thousands of dollars.

Chapter 9
Facility Compliance Monitoring

PURPOSE

The facility compliance monitoring ensures that all PWSS reporting requirements are met.

DESCRIPTION

PWS operators and laboratory technicians are important to the accurate processing of samples for producing accurate results. Using internal policies that reflect regulatory requirements help define the steps that ensure data are complete and reliable. To use internal policies properly, PWS operators may attend training to understand the need for collecting samples and for using proper collection procedures. Lab technicians follow outlined procedures to track samples and guard against contamination. Figure II-9-1 represents the flow of data to the compliance monitoring of a facility. The non-shaded boxes in the figure represent compliance monitoring.

PWS

Typically, operators collect and package samples in batches. The samples are often sent via standard mail, but some PWS may use certified mail or parcel systems that have package-tracking capabilities.

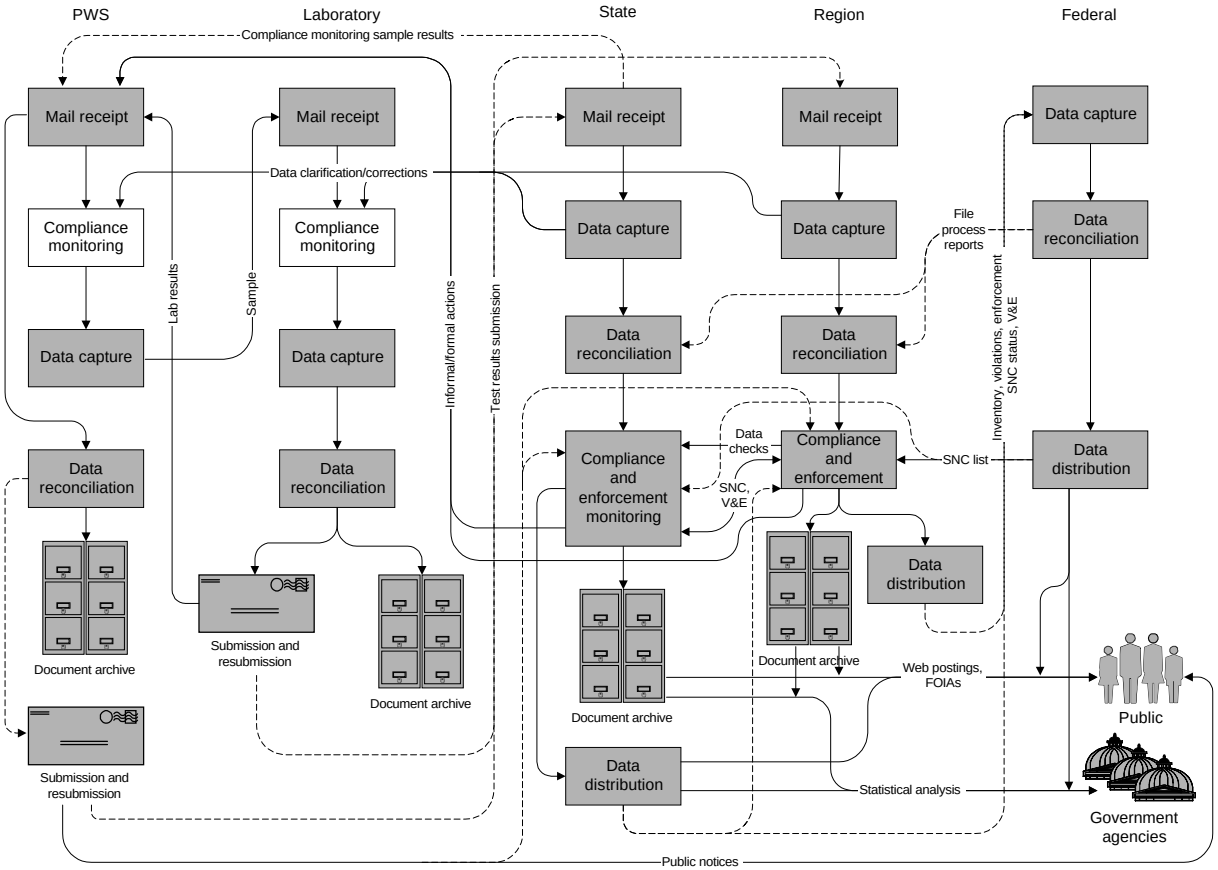
The PWS operator may be asked to address irregularities in submitted results or to collect additional samples to confirm results.

Laboratory

The lab technicians often will record the receipt of the sample at a lab station. Typically, they will record the tracking number and date and time that the sample was processed and by whom. Labs with sample-tracking systems can allow the technician to record this information immediately with bar code readers. Others may use temporary slips for entering the data later or may only use hard copy logs.

The technicians regularly process a “spike” sample to test the equipment for reliability.

Figure II-9-1. Facility Compliance Monitoring in Overall Process



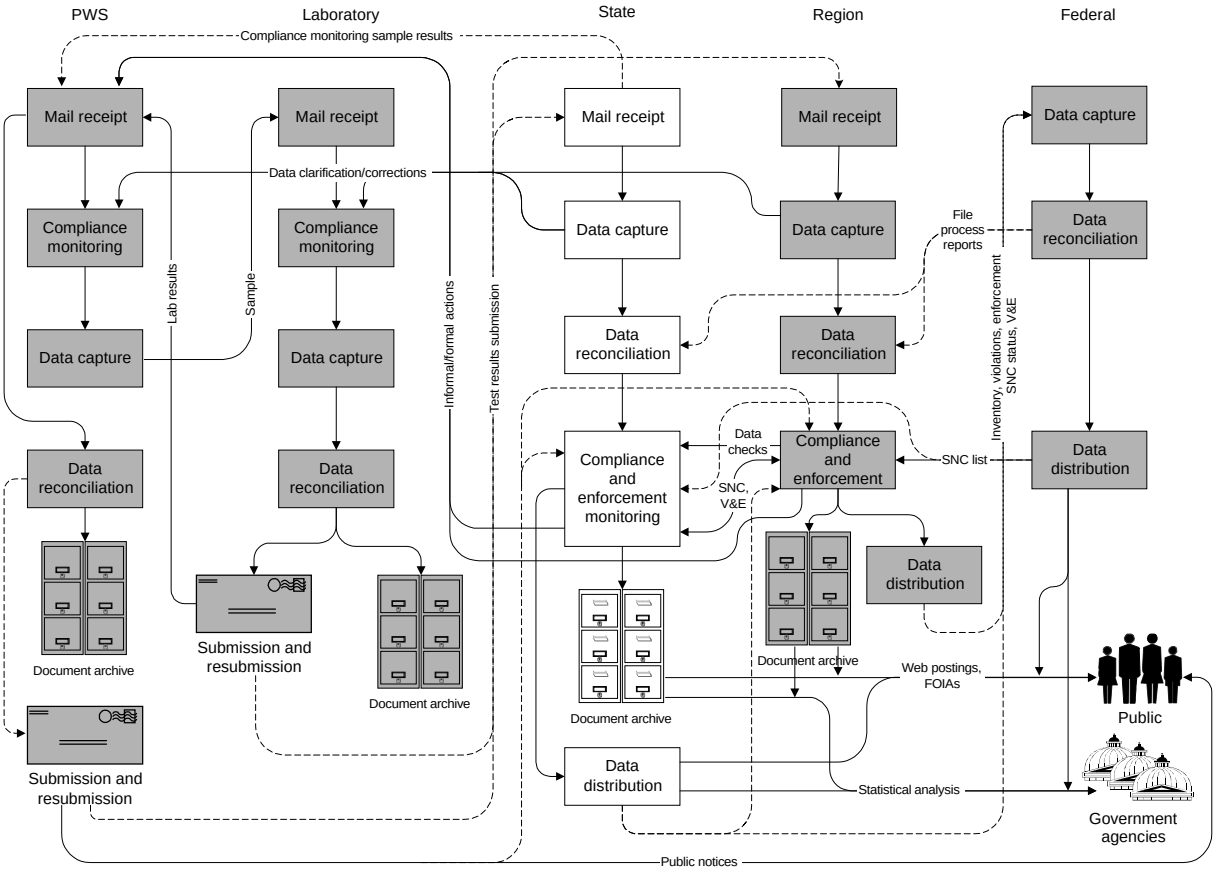
Part II
Facility

Part III
State

Chapter 1
State Process Overview

State programs that have been granted primacy by EPA receive, process, transmit, and store PWSS reports and distribute related information to the regulated community, other government agencies, and the public. The organization of a state program varies by state. However, Figure III-1-1 shows the data process flows of common functions that we discovered during our interviews of Arizona, California, Indiana, Missouri, and Texas representatives.

Figure III-1-1. State Data Process Flow



The "as is" state data flow begins when the results from drinking water sampling are transmitted from the PWS or the lab to the state. The flow consists of five primary steps executed by the state regulatory agency staff. The steps, in progression, are *mail receipt, data reconciliation, data capture, document archiving,* and *data distribution.* In general, the state's process data through information systems, monitor submissions for compliance, resolve deficiencies, and disseminate data

related to PWS and violations to a government agency (at the region or federal level). If the state has the capability, it converts the data into a proprietary format called a data transfer file (DTF) and forwards the data for processing in SDWIS/FED. If the state cannot format the data into a DTF, the state may forward the data to the region. The state also makes the data available in whole or in summary to the regulated community, other government entities, and the public. Each function of the state is discussed in the following chapters.

Chapter 2
State Program Management

PURPOSE

The purpose of state program management is

- to manage the state's PWSS program,
- to make PWS information accessible to the public and government organizations, and
- to provide outreach and assistance to PWS and testing labs with the goal of ensuring safe drinking water for the public.

DESCRIPTION

Program management involves collecting input (e.g., compliance and enforcement data), statistically analyzing the data and evaluating trends, and measuring performance to produce outputs. Outputs can include new program policy and regulatory requirements, guidance to the regulated community, Freedom of Information Act (FOIA) requests for public or private consumption, and internal and external reports for government entities. The states we interviewed have various organizational and procedural approaches for managing their programs.

Members of the state PWSS program staff review performance reports and industry trends to evaluate potential improvements to the overall data flow and, therefore, management of their program. Federal and state legislation is monitored for impacts to PWS reporting requirements and for potential changes in program management, such as increased or decreased reporting volume and resources needed.

An example of regulatory reform and active policy management is Indiana's effort to change current state regulations to improve reporting efficiency and the quality of compliance report data. The state regulations stipulate a paper-based process that directs data from a PWS to a lab, back to the PWS, and finally to the Indiana primacy agency. Indiana is updating its regulations to permit the electronic transmittal of compliance report data. Indiana is proposing to allow submissions by "other means approved by the commissioner," an intentionally unrestricted provision to accommodate future reporting possibilities (e.g., emerging technology, such as XML, or currently unknown technology that may be available in the future). The

new regulations also may allow labs to submit data directly to the state if they have the PWS's permission.

State program management also includes a broad range of oversight and outreach. The states provide guidance to PWS and testing labs for improving the quality of the data submitted. All states interviewed have a Web presence. Table III-2-1 lists the Web addresses of state water programs as of February 8, 2000.

Table III-2-1. Web Addresses of State Water Programs

State	Address
Arizona	http://www.adeq.state.az.us/environ/water/dw/index.html
California	http://www.dhs.ca.gov/org/ps/ddwem/technical/dwp/dwpindex.htm
Indiana	http://www.state.in.us/idem/owm/index.html
Missouri	http://www.dnr.state.mo.us/deq/pdwp/homepdwp.htm
Texas	http://www.tnrcc.state.tx.us/water/wu/mon/pdw.html

The Web pages provide information to the public and other government agencies and often target the regulated community. For example, the largest number of violations in Arizona are significant monitoring violations. Arizona determined that the problem was caused by the PWS's inability to determine their monitoring schedule. To help alleviate the problem, Arizona created and posted monitoring schedules on its Web site.

A state's ability to manage its PWSS program is determined by the resources it makes available and the outreach it performs. Resources, such as Arizona's monitoring schedule, and program management processes, such as Indiana's proposed reporting flexibility, affect the efficiency of the data flow and the quality of the data in the PWSS program.

Chapter 3
State Mail Receipt

PURPOSE

The state mail receipt prepares submissions received from PWS or labs for data processing, distributes miscellaneous mail (e.g., FOIA requests) to the proper area for resolution, and, in some cases, archives data.

DESCRIPTION

Figure III-3-1 depicts the state mail receipt in the overall process.

Figure III-3-1. State Mail Receipt in Overall Process

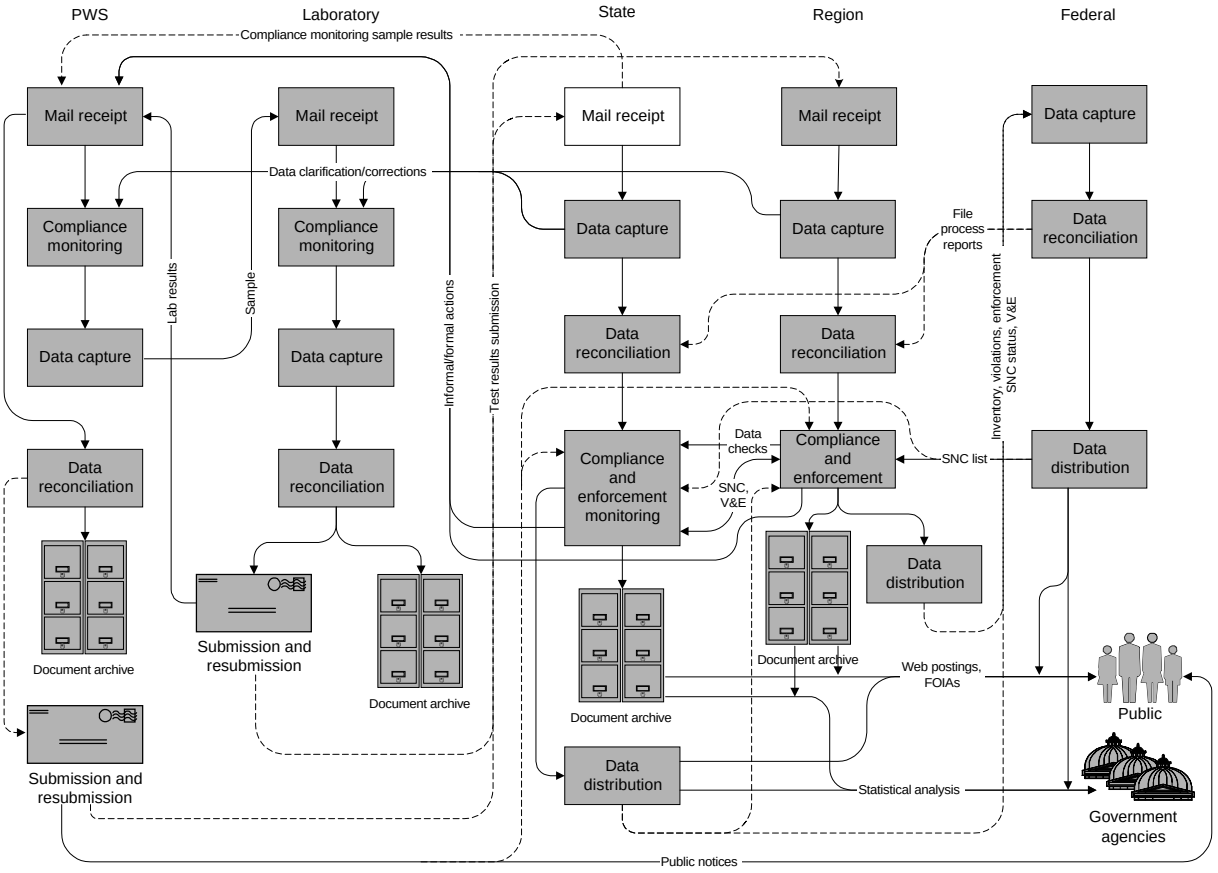
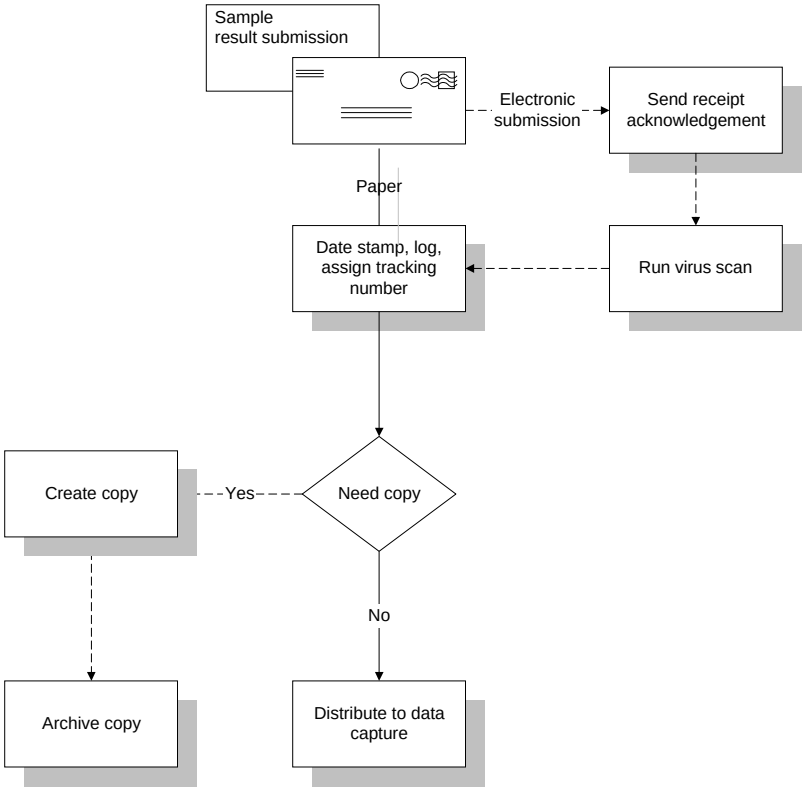


Figure III-3-2 illustrates how compliance reports are received in the “as is” mail receipt process of the state.

Figure III-3-2. State "As Is" Receipt of Compliance Reports



The mail receipt process begins when a PWS's compliance monitoring report is received. The report is sent to the state by a lab, which can be a state lab, a private EPA-certified third-party lab, or the PWS or its state-certified lab. Submissions follow the same process whether they are submitted by a lab or by the PWS. Of the states interviewed, Arizona receives reports from labs and PWS; California, Missouri, and Texas receive reports primarily from labs; and Indiana receives results from only PWS.

The states that collect sampling results from labs have relatively few submitting organizations. For example, Missouri receives 90 percent of its data from three state labs: Missouri Department of Health, Jefferson City, for bacteriological testing results; Department of Health, St. Louis, for radionuclide testing results; and the Environmental Services Program (ESP), Jefferson City, for chemical testing results.

In contrast, Indiana receives all PWSS compliance reports directly from the PWS; therefore, the state receives reports from approximately 5,000 submitting entities each month. The large number of submitting organizations makes receiving the mail very complex, and frequently reports are not sent to the correct office. Even after implementing solutions for improving mail receipt (such as a mailbox and fax machine dedicated to the monthly PWSS compliance reports), reports were still lost because mail was directed improperly. Indiana is proposing a rule that

allows labs to submit data directly to the state if the lab has written permission from the PWS. This change should improve the receipt of mail.

PWSS compliance data are sent primarily to the states on paper, but several approaches for submitting the data electronically have been or are being developed. Indiana accepts reports as e-mail attachments (e.g., Zip, Microsoft Excel, and Microsoft Access files), but requires a paper copy of the submission. At least 50 percent of reports submitted to Arizona are on paper from one laboratory. However, a few municipalities in Arizona mail data on diskettes using a process from a previous unsuccessful attempt at electronic reporting. Missouri's state chemical lab sends electronic batch files directly to the state, but also provides paper reports of the chemical analysis data. California has the largest number of reports sent electronically; approximately 75 percent are sent as e-mail, diskette, and Web submissions. California prefers receiving e-mail and Web submissions instead of diskettes because diskettes frequently are damaged in the mail. California tried to implement a "bulletin board" system, which the state discontinued because it was not used. Although various attempts have been made to alter the reporting format and mode, and the sources submitting sample results vary, the data receipt function is generally the same for all states.

Table III-3-1 depicts the source of compliance data reports and the annual volume of reports received by the states.

Table III-3-1. Sources and Annual Volume of Submissions

State	Number of PWS reporting to state	Number of labs reporting	PWSS data submissions received
Arizona	minimal	Of the 170 state-certified labs, 1 lab provides at least 50 percent of the 1,800 PWS' analyses.	85,000
California	0	400 labs for 8,700 PWS	1,000,000[a]
Indiana	4,255	0	60,000
Missouri	0	3 state labs (TCR, radionuclide, chemical) and 59 other labs (25 send majority of submissions) for 2,747 PWS	89,000[b]
Texas	0	2 labs that report chemical data and more than 90 labs (TCR) for 6,757 PWS	320,000

[a] *Drinking Water Quality Monitoring Data 1984-1997-Annual Status Report,* November 1998, p.2.

[b] Includes TCR volume only.

The volume of sampling results that the states receive varies seasonally. The most reports are sent in the summer months when campgrounds, outdoor swimming pools, and other seasonal water providers are in operation.

A PWS usually reports monthly. However, the frequency of data reported depends on the populations, contaminants, and required repeat sampling. Certain

data (e.g., sanitary survey information, which is required every three years) can be reported as infrequently as quarterly, semiannually, annually, or longer.

The reporting frequency required by the *Code of Federal Regulations* (CFR) 141.31 for PWS reporting to states holding primacy are listed in Table III-3-2.

Table III-3-2. Reporting Requirements and Frequency for PWS to Primacy States

Requirement	Report frequency
Results of test measurement or analysis required in CFR Part 141	Within 10 days of month when results are received
Failure to comply with a primary drinking water regulation, including monitoring requirements, in CFR Part 141	Within 48 hours of failure, unless state lab performs analysis and reports results to state
Copies of each public notification required by CFR Part 141.32	Within 10 days of completion of each public notice
Copies of records required to be maintained by CFR Part 141.33 and copies of documents that the state is entitled to by Section 1445 of SDW Act or state law	Within requested time

Unless a PWS or lab submits information via certified mail, the state usually does not send an acknowledgement to the PWS or the lab after receiving their submission. An exception is the verification sent by California by e-mail for e-mail submissions or facsimile for diskette submissions. In addition, Missouri acknowledges receiving the submission when it sends the sampling results to the PWS after receiving them from the laboratory. Therefore, when a PWS receives its sampling results, they are confirmation that Missouri has received and is processing the sampling data.

Several states have created standard versions of monitoring forms. Arizona has a state-generated form available on the Internet but does not require its use. However, if a PWS wants to use a form other than the Arizona-generated form, the state must approve the form. California has standard hard copy and digital forms that submitters must use.

When a submission arrives at the state, the state uses the postmark on the submission as the official compliance reporting date or the submission is date-stamped. For example, Indiana stamps the date on a submission when it receives a compliance report and uses the date for compliance purposes. California issues a tracking number for a paper receipt and logs the submission if it is electronic.

SECURITY

The paper forms often must be signed or initialed by the lab technician who performed the analysis. If a PWS operator reviews the results before they are submitted to the primacy agency, the operator may sign that he or she has seen the results. The primacy agency does not verify the authorization of the signer, only that it is signed at the time of receipt.

Trade or other confidential business information is rarely a concern for the interviewed states.

After all of the above has been completed, the submission is ready for the data capture part of the process flow.

Chapter 4
State Data Capture

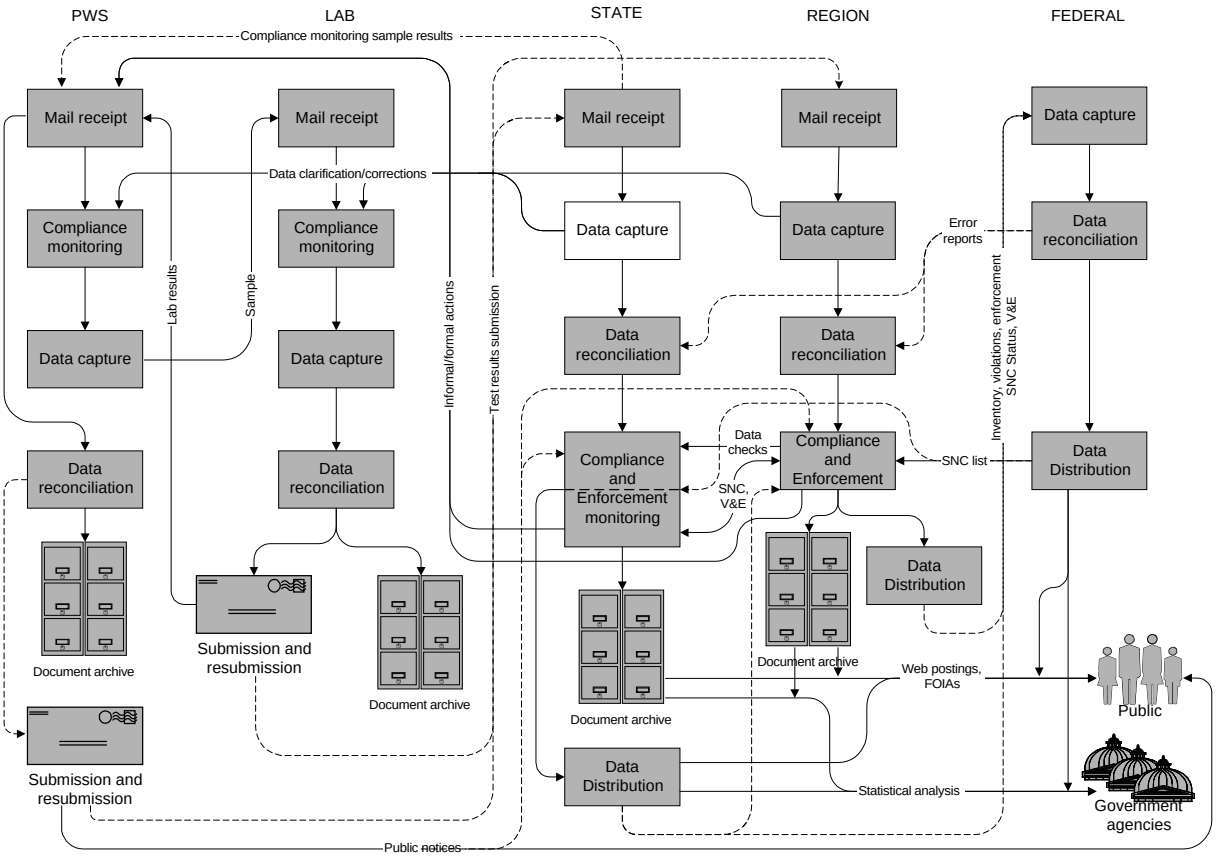
PURPOSE

The purpose of the state data capture is to capture PWSS data in a state database.

DESCRIPTION

Figure III-4-1 shows how the state's data capture fits in with the PWSS. The data capture for the state are shown in non-shaded boxes in the figure.

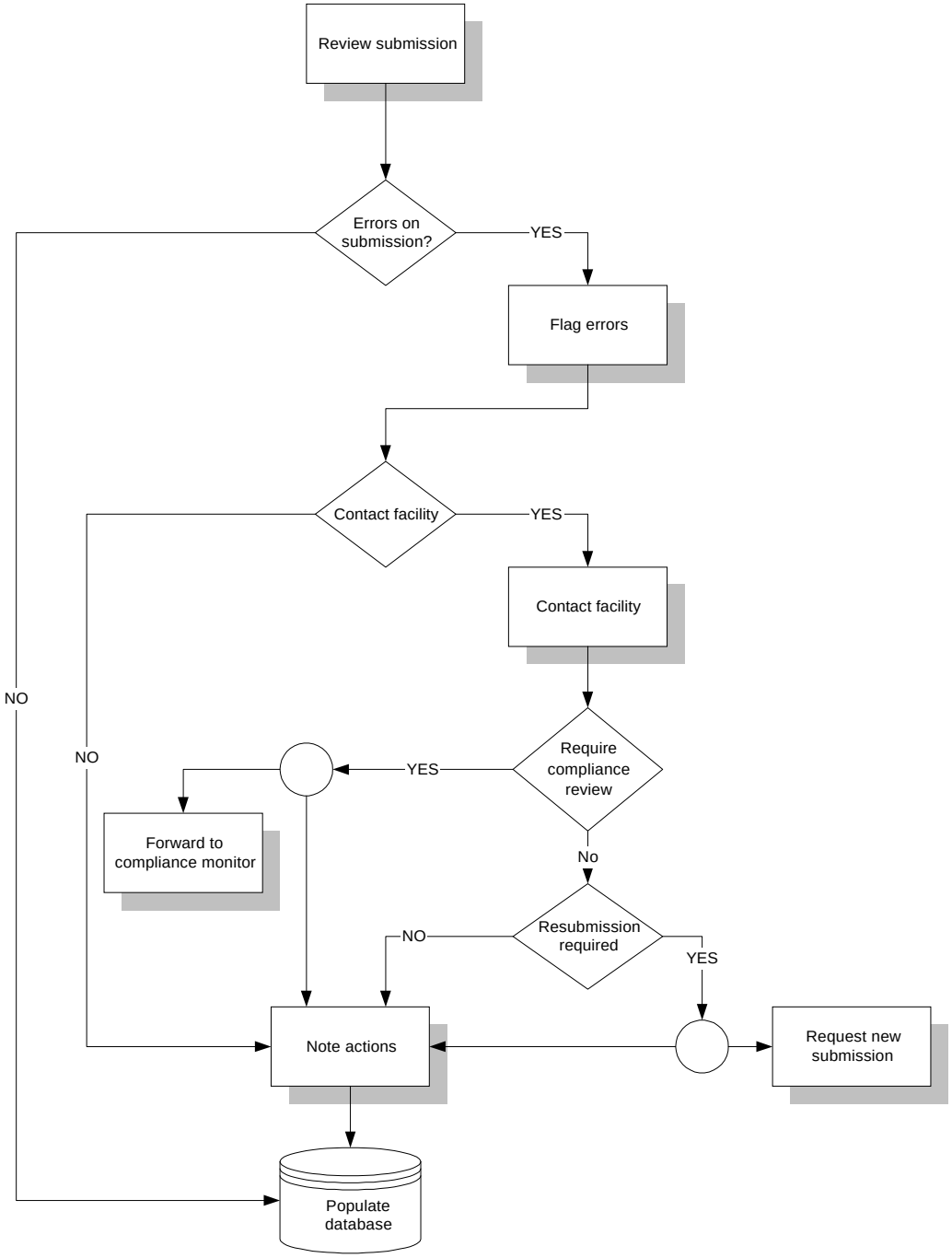
Figure III-4-1. State Data Capture in Overall Process



The state typically reviews the PWS's results for completeness, legibility, and typographical errors. In general, the data clerk identifies potential discrepancies or omissions and flags them for a member of the compliance staff. In some processes, compliance staff members initially review the PWSS submissions.

Figure III-4-2 shows how these activities comprise a generically defined data capture process.

Figure III-4-2. State "As Is" Data Capture Process



The states receive either a mix of paper and electronic submissions or only paper submissions. No state receives all electronic submissions. Of the states interviewed, California receives the most electronic submissions, which comprise at

least 75 percent of its total collection. Most reports for states are submitted on paper. Therefore, each form is entered manually into the state's system.

The main issues in data submissions are the following:

- Typographical errors in report submissions
- Incomplete or inaccurate inventory information
- Failure of the PWS to report
- Misplacement of data submissions by the state.

Data-entry staff consult technical analysts about possible errors in submitted data. The technical analyst determines if the PWS needs to be asked to resubmit. Obvious typographical errors in submissions are corrected at the discretion of the analyst (e.g., changing pH 69 to pH 6.9). According to California's *QA Procedures for Drinking Water Quality Data Transmission and Management*, "The most common error is invalid or incomplete [water] source numbers."[1] In most cases, this type of inventory information is verified and corrected.

Of California's hard copy submissions (about 25 percent of its total submissions), 75 percent are submitted to a district office for initial review before being forwarded to the state for data entry. Missouri also has an additional level, the region. The region office captures the data for TCR data analyzed by the Missouri state lab.[2] The region office is on the same site as the state PWSS program office. The other states we interviewed review submissions and enter data at the state level.

The percentage of submissions that require contacting the submitters for accuracy checks or corrections is not known. No follow-up is made unless errors are noted or a submission is not received.

[1] State of California, Department of Health Services, *QA Procedures for Drinking Water Quality Data Transmission and Management.*

[2] See Appendix C for a flow diagram of Missouri. The diagram contains the Missouri region level.

Chapter 5
State Data Reconciliation

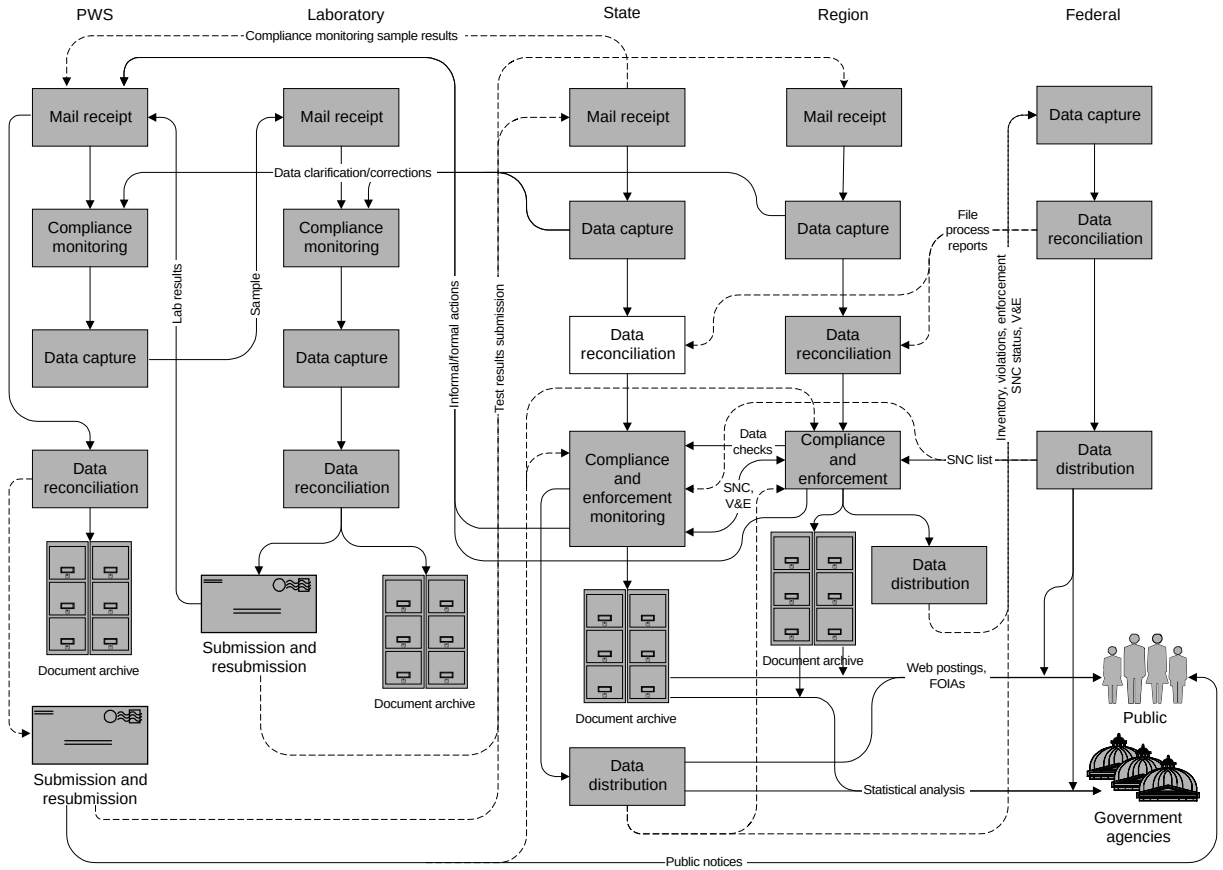
PURPOSE

The state data reconciliation identifies and corrects errors before the data are transferred to SDWIS/Fed.

DESCRIPTION

The relationship of the data reconciliation process to the overall data process flow is represented in Figure III-5-1. Data reconciliation is shown as a non-shaded box in the figure.

Figure III-5-1. State Data Reconciliation in Overall Process



Because most data are entered manually, errors occur that need to be reconciled. Most states conduct a data assurance check. The processes vary by state. The

complexity of checks varies from little manual reconciliation, such as in Indiana, to a complex predefined automated routine, such as in California. Thus, portraying a generic flow pattern of data reconciliation for states overall is difficult.

The individual state processes include the following:

- In Missouri, a data entry check report (the exact data entry input information) is prepared after each day's entry and visually verified with the lab reports to correct errors before the system processes the data. Data for the Missouri system are viewed by edit checks on the data entry screens and additional edit checks when sent to the mainframe for processing.

- Texas' general guidelines are to review 10 percent of data entry work for completeness and errors, but in some cases the state reconciles complete data.

- Arizona runs a batch edit routine to provide instant feedback on accuracy, such as valid identification and specimen numbers.

- Indiana has fewer than one percent errors caused by data entry, and does not have a formal procedure for reconciling data. Usually, the state's technical staff checks for quality assurance and quality control (QA/QC) before uploading the final data into the state database.

- California enters all hard copy submission data twice. If the data files do not match, a mismatch report is generated and the numbers are entered again. The double-entry process has shown that California's error rate caused by data entry is between 1 and 5 percent. Because most of California's reports are electronic, the following additional automated reconciliation procedures take place:

  - The unique identifier code (state primary station codes) in the record is checked to verify that it is a valid existing number recorded in the database.

  - The database is screened to verify that the record is not a duplicate.

  - The format of each field in the record is verified by the field attributes of the database (e.g., proper lengths, logical dates, numerical fields that do not contain alphabetic characters).

  Most unique identifier codes and formatting errors are from LIMS-generated electronic data transfer (EDT) files. When all errors are corrected, the data are finalized in the state's database.

Chapter 6
State Archiving

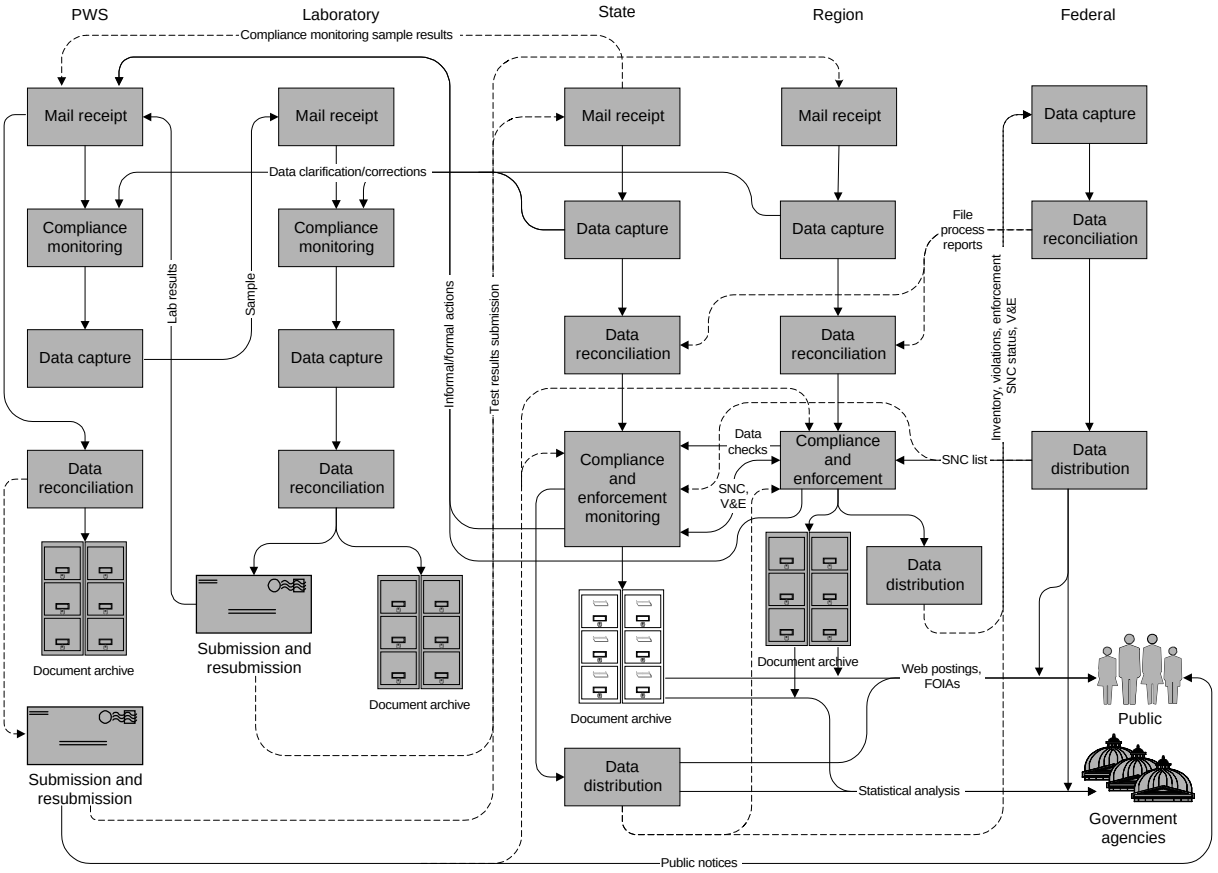
PURPOSE

The state tracking and archiving ensures that original, current, and historical submission-related documents are maintained in files for the required period.

DESCRIPTION

The relationship of tracking and archiving to the overall process flow is represented in Figure III-6-1.

Figure III-6-1. State Document Tracking and Archiving in Overall Process



"State record-keeping requirements specified in 40 CFR, Section 142.14, include the following types of records: an inventory of PWS, microbiological and chemical analyses of drinking water samples (including records of analytical methods used and the number of samples analyzed), sanitary surveys, state approvals or other decisions, and variances and exemptions granted."[1] States archive and track the data in the formats as described below.

- Indiana creates a microfiche of the data and keeps the paper submissions indefinitely. All submissions of data for compliance reports are tracked by the month submitted.

- California uses electronic archives. It discards hard copy reports after a successful load using the double-entry system[2] or returns them if requested by the district office.[3]

- Texas has a mix of electronic and paper archives, depending on the report. Texas maintains paper archives for 10 years and electronic archives indefinitely. State records are maintained locally and off site. Data about inventory, compliance reports, violations, and enforcement are stored in the same application.

- Similar to Texas, Missouri supports a mix of electronic and paper archives. Missouri stores data about inventory, bacteriological compliance, and bacteriological violations in one internally developed proprietary application. All other data are stored in relational database files, except for a few hard copy archive files. Missouri's server and mainframe each maintain a copy of data of inventory, monthly operating reports, and violations and enforcement. The mainframe files are backed up off site. The server files, which contain other relational database files in addition to the data about inventory, monthly operating reports, and violations and enforcement are backed up locally.

- Arizona archives only hard copy reports for up to 40 years; currently, data date back to 1987. Arizona is analyzing the space constraints of archiving.

[1] The Cadmus Group, *Information Collection Request for Public Water Systems Supervision Program*, OMB Control No. 2040-0090; EPA ICR No. 0270.38, Craig Damron and Charlene Shaw, July 1997, p.28.

[2] See Part III, Chapter 5, of this report for more information.

[3] See Part III, Chapter 4, for an explanation of the role of California district offices.

Table III-6-1 lists each state's method of archival.

Table III-6-1. Archiving Method by State

State	Paper or other hard copy archive system	Electronic archive system
Arizona	x	—
California	—	x
Indiana	x	—
Missouri	x	x
Texas	x	x

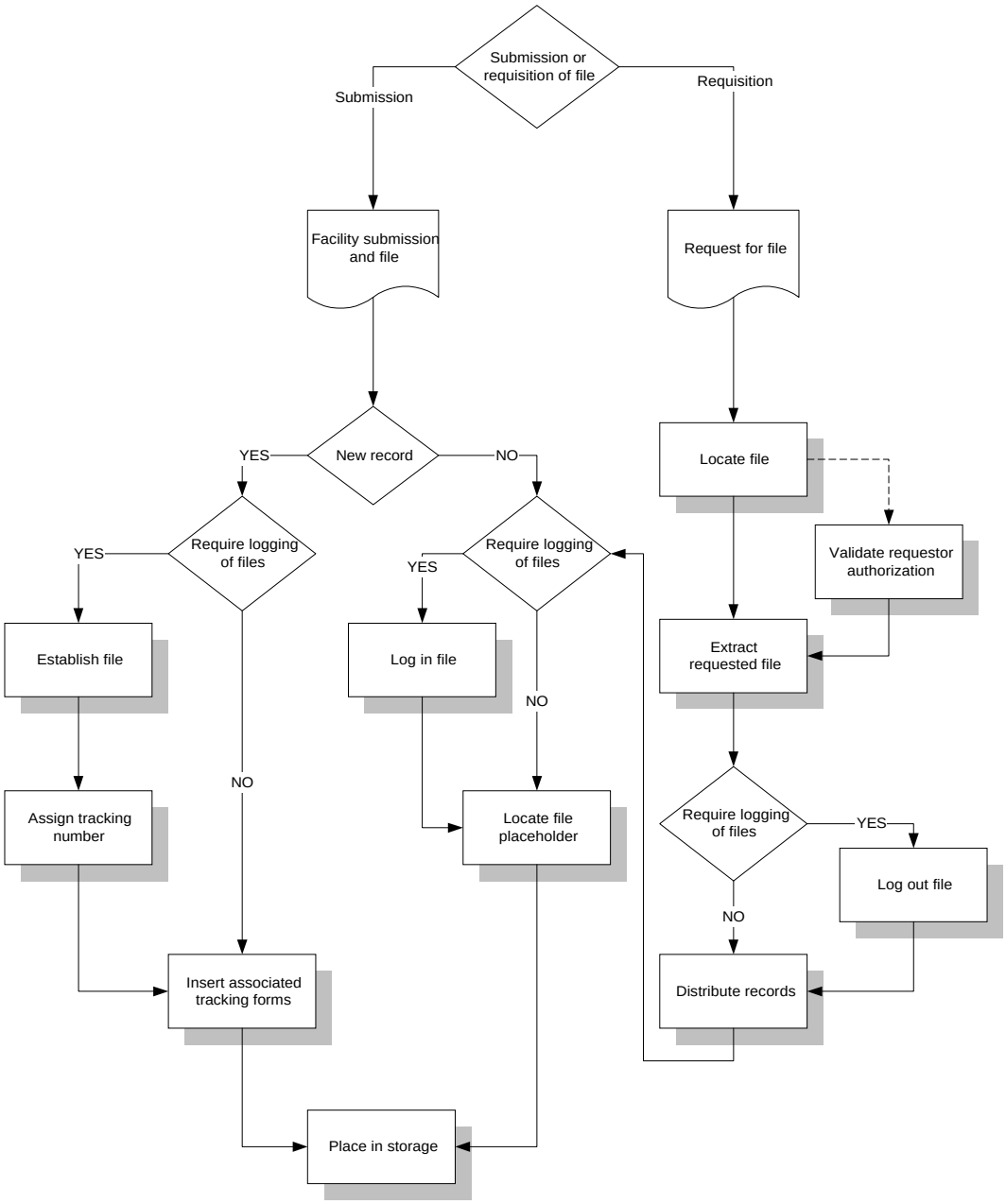
Table III-6-2 lists the retention schedule required by CFR 40 142.14 for states with PWSS primacy.

Table III-6-2. Record Retention

Requirement	Minimum record retention period
Microbiological analyses	Not less than 1 year
Records of analyses for other than microbiological contaminants	Not less than 40 years (may be transferred to EPA after 10 years)
Current inventory records of PWS	Not less than 12 years
Reports of sanitary surveys	Not less than 12 years
Records of state approvals	Not less than 12 years
Records of enforcement actions	Not less than 12 years
Records concerning granted variance or exemption	Not less than 5 years after expiration of variance or exemption

Missouri follows the recommended EPA record-retention policies as listed in Table III-6-2 and has a set schedule for data archiving. Paper records are archived off the site in the Missouri State Archive or destroyed as appropriate, depending on the retention schedule. Missouri archives a copy of the original compliance report submissions. After the compliance report data are manually entered, a copy of the data is made and archived as well. The typical state "as is" document storage process is illustrated in Figure III-6-2.

Figure III-6-2. State "As Is" Document Storage Process



Chapter 7
State Data Distribution

PURPOSE

The state data distribution process consolidates data from compliance monitoring and disseminates the data to EPA headquarters, regional program offices, the regulated community, government officials, and the general public. The distributions are in the form of compliance and inventory data uploads to SDWIS/FED, annual reports, and enforcement actions.

DESCRIPTION

Figure III-7-1 depicts the data distribution process in the overall data process. Data distribution is shown as the non-shaded box in the figure.

Figure III-7-1. State Data Distribution in Overall Process

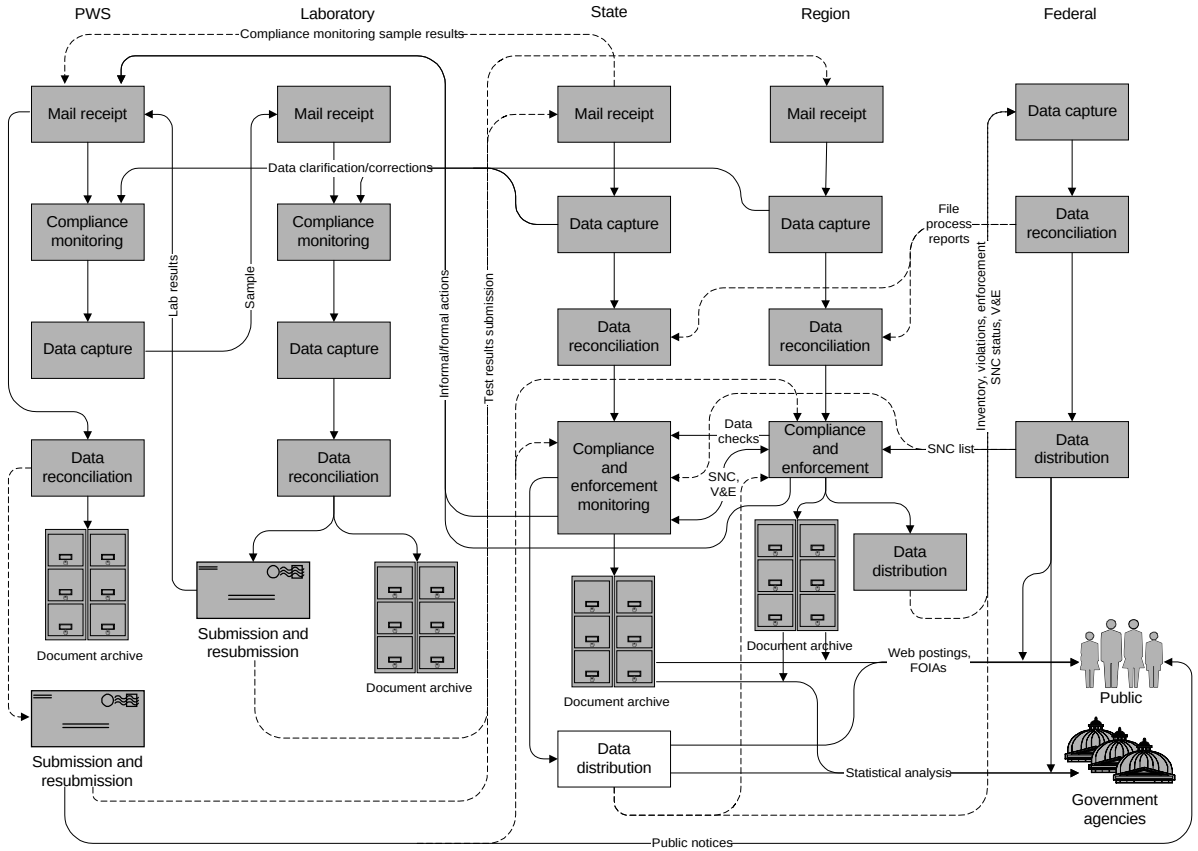
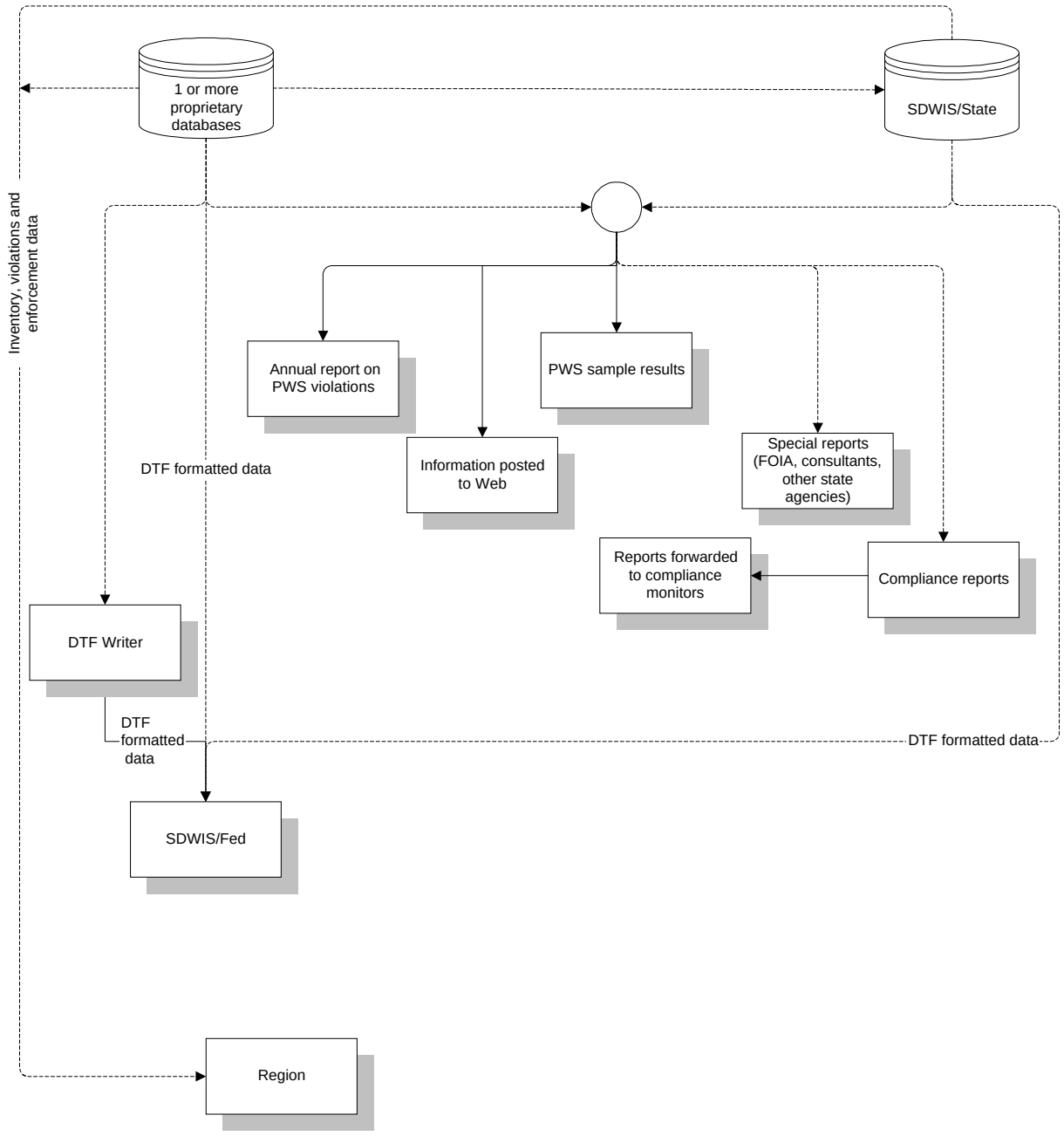


Figure III-7-2 depicts the state "as is" data distribution process.

Figure III-7-2. State "As Is" Data Distribution Process



The state data distribution consolidates data from PWS and forwards the data to EPA headquarters. The requirements and reporting frequencies for distributing data are listed in Table III-7-1.

Table III-7-1. Reports Required for SDWIS/FED by 40 CFR 142.15

Requirement	Report frequency
Report of new data related to SDWIS inventory elements and revisions of existing data	Annually
Report of new violation data and revisions of existing data	Quarterly
Report of new enforcement data and revisions of existing data	Quarterly
Notice of granted variance or exemption, including reasons and evidence for the need of a variance or exemption and assurance that it will not cause an unreasonable health risk	Quarterly

SDWIS/FED is the federal database for PWSS data.[1] SDWIS/FED accepts data only in a proprietary DTF format. States have three ways of manipulating their data into the DTF format. They can use

- a proprietary system that formats their data,
- DTF Writer, or
- SDWIS/STATE.

The EPA uses a proprietary system with internal programming for formatting data in DTF. The disadvantage of a proprietary system that automatically generates the DTF format is that the system can become obsolete. If EPA HQ updates its file format, the resources to create the proprietary system are sunk costs and the state will have to modify its system at additional expense to become compatible with the federal modification. Texas and Arizona have proprietary systems that format their captured data into the DTF format.

DTF Writer is a DOS-based data-entry package. It enables states to enter summary information and creates a transfer file in DTF format that can be used to transmit compliance data via a file transfer protocol (FTP). By using DTF Writer, the states do not have to create a proprietary system. Upgrading DTF Writer is easier to implement and less costly than upgrading a proprietary system. The disadvantage of DTF Writer is that the state must enter data again. The duplication is costly, adds a step to the process, increases lead-time, and increases the likelihood of human error or technical malfunction. Although Missouri can upload inventory data directly from its system, it enters summary exception data into DTF Writer for the remaining headquarters requirements.[2]

SDWIS/STATE is a federally designed and maintained database modeled after SDWIS/FED.[3] SDWIS/STATE is the best alternative for converting data into the DTF format. SDWIS/STATE is the repository for the data as well as the system

[1] SDWIS/FED is discussed in Part V, Chapter 8.

[2] See Appendix B for a process flow diagram of Missouri's data transfers.

[3] Information about SDWIS/STATE is in Part III, Chapter 8.

that formats the data. Because SDWIS/STATE is regulated at the federal level, SDWIS/STATE upgrades are compatible with SDWIS/FED. Currently, Indiana and California transfer their data from proprietary databases to SDWIS/STATE, which converts the data to the DTF format for uploading to SDWIS/FED.

To match the DTF layout, some states rely on the EPA region to convert their data. For example, Arizona forwards a summary of their data to the region, and the region converts the data into the prescribed DTF format.

Table III-7-2 lists the processes that the states we interviewed use to format their data.

Table III-7-2 Current Mode of DTF Formatting by States Interviewed

State	Forward to region	Proprietary formatting system	DTF Writer	Proprietary system upload to SDWIS/STATE	Transfer protocol
Arizona	x	x	—	—	FTP
California	—	—		x	Not provided
Indiana	—	—		x	Not provided
Missouri	—	Inventory data	x	—	Direct connection and FTP
Texas	—	x	—	—	Not provided

In addition to compiling and transmitting data to SDWIS/FED, the data distribution disseminates information to the public and other government agencies as mandated. For example, the amended SDWA requires that states with primacy prepare an annual report on PWS violations, make it available to the public, and submit it to EPA. The report identifies violations of national primary drinking water regulations by PWS in the state, including violations related to MCLs, treatment requirements, variances and exemptions, and monitoring requirements.

Data distributed by a state should meet public disclosure requirements and enable lawmakers to evaluate the performance of their primacy agency.

Chapter 8
State Information System

The state PWSS compliance systems have the following roles:

- Maintain an inventory of state PWS
- Support effective PWSS program implementation
- Promote sound planning, evaluation, and decision-making
- Provide data for state legislatures and the general public
- Facilitate the use of PWSS-reported data.

States may use SDWIS/STATE as their compliance tracking system or develop a proprietary system. SDWIS/STATE, the state equivalent to SDWIS/FED,[1] is a database designed, developed, and maintained by EPA to facilitate state management of their PWSS programs.

SDWIS/STATE houses three major categories of information: inventory, sampling, and monitoring and noncompliance. By comparing the monitoring schedules to the sampling data, SDWIS/STATE can automatically determine noncompliance with the TCR. EPA updates the SDWIS/STATE software periodically to add new capabilities, such as noncompliance determinations for other EPA drinking water rules. SDWIS/STATE automatically formats the state's compliance data into DTF for upload into SDWIS/FED.

The latest version of SDWIS/STATE is version 6.0, which runs on an Oracle platform. SDWIS/STATE is available for purchase from EPA for $25,000. The price includes the following:

- Database
- Installation of the database
- One week of training.

The state can customize SDWIS/STATE or can have the developer of SDWIS/STATE make modifications. Having the developer modify the software may be desirable because SDWIS/STATE may not meet unique state needs. Several users indicated that additional features are needed, such as remote access, which will improve the ability of SDWIS/STATE to meet their needs.

[1] See Part V Chapter 8 for details about SDWIS/FED.

Another alternative is for the states to develop customized, proprietary compliance databases. These databases tend to reflect specific reporting requirements of the state, allow integrating data with other environmental programs in the state, or provide other functionalities not available in SDWIS/STATE.

Proprietary systems are expensive to build, and the state needs to provide its own technical support. Of the states we interviewed, none had fully functional SDWIS/STATE databases. Indiana plans to have SDWIS/STATE fully operational in early 2000, and Missouri hopes to implement SDWIS/STATE in early 2001. EPA estimates that 25 to 30 states will adopt SDWIS/STATE as their data management system by 2001.

States have a variety of hardware and software. Table III-8-1 identifies the hardware and software in use.

Table III-8-1. Hardware and Software

State	Firewall	Main-frame	Server	Internet access	Server operating system	Commercial off-the-shelf packages	SDWIS/ State	EDI	Future	DTF Writer
Arizona	x	x	Sun Solaris	x	Unix	Oracle 7.1.6 Lotus Notes WordPerfect			Windows NT	
California		x	x	x						
Indiana			x	x	Novell	Microsoft Access 97	5.35		Pentium 3 Oracle database	
Missouri	x	x	x	x	Windows NT	Microsoft FoxPro dB/2			SDWIS/State	x
Texas	x	x	x	x		Microsoft FoxPro Microsoft Access		x	Oracle	

The states have a variety of database systems for PWSS data. Table III-8-2 lists the systems currently used by each state.

Table III-8-2 State Databases

State	System
Arizona	Proprietary Oracle database
California	Dual proprietary databases (one LAN database and one mainframe database)
Indiana	Proprietary Access database (transitioning to SDWIS/STATE)
Missouri	Various proprietary MSFoxPro and dB2 databases
Texas	Proprietary database

Missouri has an internally developed proprietary system named the PDW (public drinking water) system. PDW is an automated system that uses dB2 and includes inventory and bacteriological compliance data. Data from compliance reports for other contaminants (chemical and radiological) are maintained in independent MSFoxPro database files. The FoxPro files are manipulated manually using query and report programs. Missouri uses personal computers for user interface, a network server for file storage and local access, and a mainframe for processing and storing permanent data. Although SDWIS/STATE resides on an Oracle database and Missouri's department standard is IBM's dB2, Missouri hopes to migrate to SDWIS/STATE in early 2001 after EPA generates a db2 version of SDWIS/STATE.

Texas operates an internally developed information system that uses a variety of databases, including FoxPro, Microsoft Access, and Oracle.

Arizona operates a proprietary system in a mainframe environment. The system has a Sun Solaris server, which runs a Unix operating system. Arizona plans to migrate to Windows NT because of its current 16-bit infrastructure. The transition is projected to be completed within a year.

At the time of our interview, Indiana was running a prototype version of SDWIS/STATE Version 5.35 in parallel with an internally developed Microsoft Access database. Approximately 75 percent of compliance data results were entered into SDWIS/STATE directly. Indiana's goal is to have SDWIS/STATE fully operational by January 1, 2000.

California operates in a dual database environment that uses proprietary systems. Data are collected from PWS and labs and loaded into a LAN database. After the data are loaded into the LAN[2] database, the data are loaded to their mainframe database.[3] The LAN database is used for data processing, and the mainframe supports user queries.

California collects the most submissions in electronic format. It implemented an initiative, named the EDT program, to collect compliance reports in electronic format in 1990. A major factor in the success of the program was the development of Write-on, a data-entry software package developed by California. California provides Write-on to labs and PWS to ensure they submit data in a consistent format that reduces errors in data entry. This package is available free to certified laboratories and PWS. The software package generates an American Standard Code for Information Interchange (ASCII) data file in the standard state format. California updates Write-on annually or as necessary to incorporate changes to MCLs, chemicals, and other monitoring requirements. For ease and quality of data entry, the software package contains libraries with all state-regulated PWS and sources. Monthly updates of the libraries are posted to a state bulletin board.

[2] See Part III Chapter 5 for details on California's dual data-entry reconciliation process.

[3] See Appendix C for a flow diagram of California's data.

In addition, California created a guideline document to assist laboratories in programming their LIMS to generate an ASCII file similar to the Write-on-generated files. California also consults with the laboratories as needed.

Chapter 9

State Compliance and Enforcement

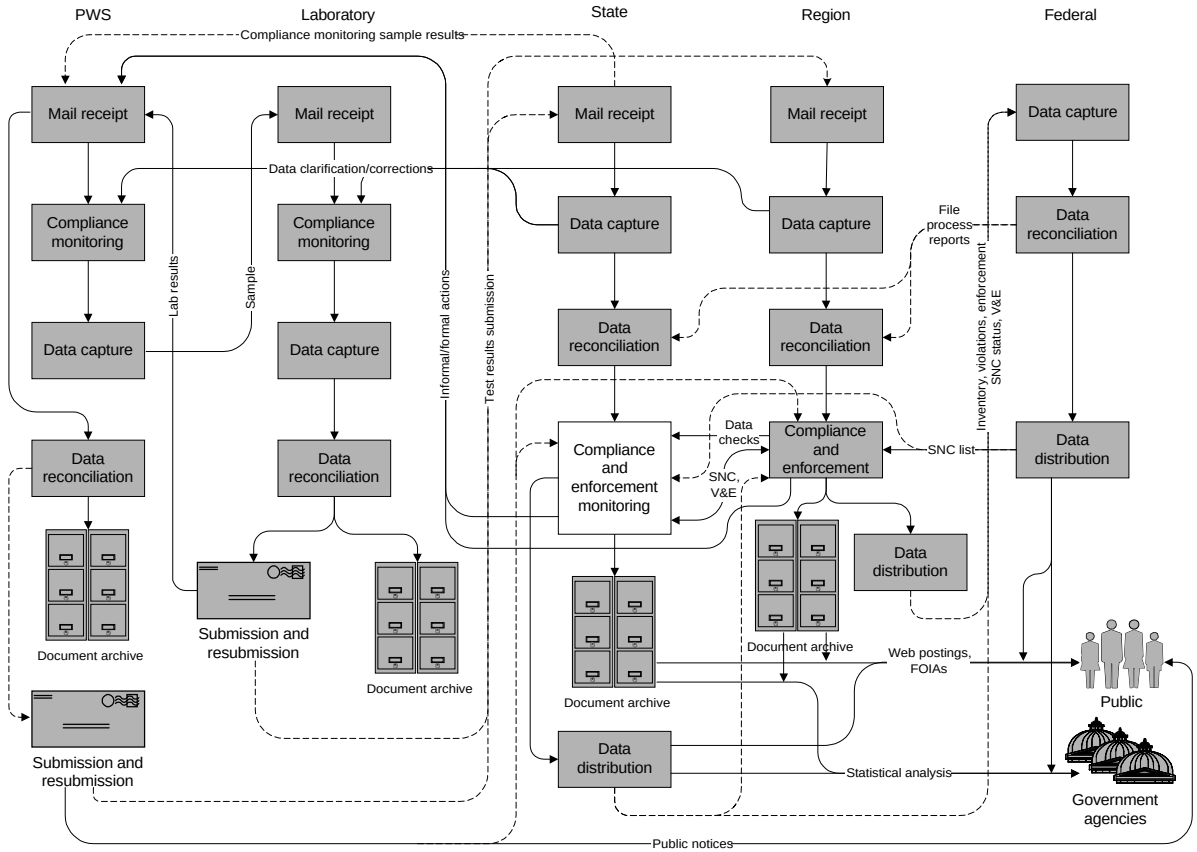
PURPOSE

The purpose of state compliance is to review reporting, prepare for and conduct compliance audits, and monitor sampling results for violations. State enforcement evaluates PWS compliance and ensures that they meet PWSS requirements.

DESCRIPTION

Figure III-9-1 depicts the state compliance and enforcement monitoring in the overall data process flow. Compliance and enforcement is affected directly or indirectly by numerous functions in the data process flow. Depending on which state is affected, the region, federal, PWS, or laboratory could affect the state.

Figure III-9-1. State Compliance and Enforcement Monitoring Process



COMPLIANCE

Violations related to compliance submissions include failing to report, reporting incompletely or inaccurately, and being in violation of PWSS MCLs or treatment techniques. LMI reviewed EPA's *1997 National Public Water System Compliance Report*[1] for pertinent qualitative and quantitative information pertaining to state compliance. We took the general compliance information in this chapter directly from that report.

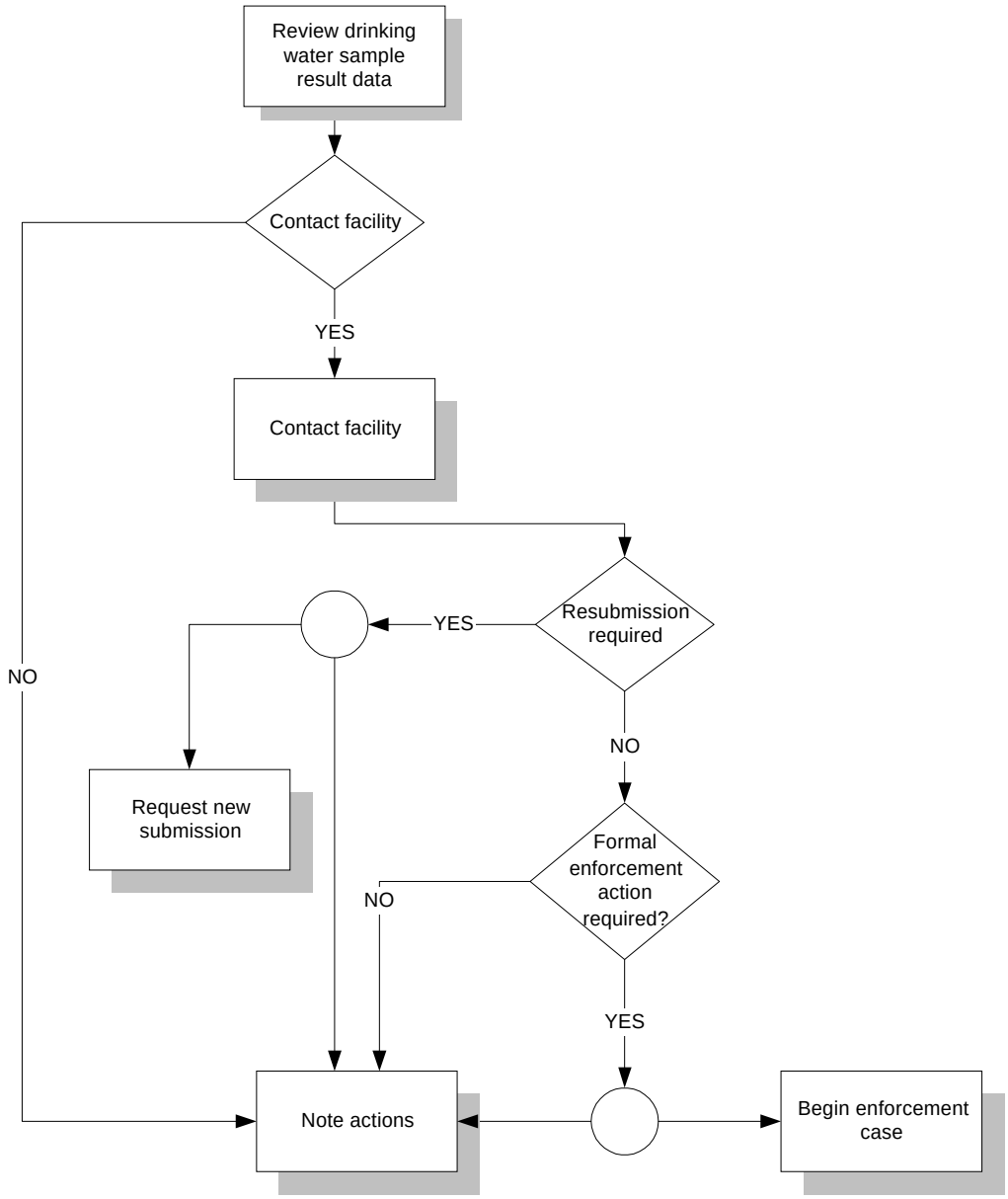
States engage in a variety of activities, including formal enforcement actions, informal actions, and compliance and technical assistance to help PWS remain in, and return to, compliance. In addition, SDWA requires that states have operator certification programs that require many PWS operators to be licensed by the appropriate authorities. State enforcement and compliance may include:

- Conducting onsite visits and sanitary surveys at PWS (i.e., an onsite review of the water sources, facilities, equipment, operations, and maintenance of a PWS to evaluate the adequacy of these elements for producing and distributing safe drinking water)
- Helping systems invest in preventive measures
- Assisting financially with system improvements through the Drinking Water State Revolving Fund and other state funding programs
- Reviewing water system plans and specifications
- Conducting training sessions
- Holding public information meetings
- Loaning specialized monitoring equipment
- Publishing bulletins and newsletters about new information, training events, and such.

Figure III-9-2 illustrates a generic process that may occur if a submission is not compliant. The facility or the testing lab may need to clarify the nature of violations and what actions are necessary to correct the violation if the data are noncompliant. The compliance staff may determine that another sample or an enforcement action is needed. Decisions are noted and kept with the facility's records.

[1] Environmental Protection Agency, *1997 National Public Water Systems Compliance Report*, April 1999, p. 20. The quantitative data in EPA's report were compiled from SDWIS/Fed.

Figure III-9-2. State "As Is" Compliance and Enforcement Process



Compliance data is reviewed by using reports generated by the state computer systems and SDWIS/FED. Missouri generates ad hoc queries and preliminary unaddressed significant noncompliance (SNC) lists (an official SNC list is distributed quarterly by EPA) from SDWIS/FED. Indiana sends state-generated noncompliance reports to Region 5. The reports Indiana sends are generated by querying its proprietary MS Access database. Indiana cannot generate all of its current reports with SDWIS/STATE, version 5.35, which is only capable of running compliance determinations on TCR data. Missouri's proprietary state system generates a monthly report of TCR violations, which is given to its enforcement division.

PWS may request that the state grant a variance or exemption from their normal reporting requirements. Each quarter, the state must present its region a justification for each variance and exception granted to a PWS. The state must show that granting the request was necessary and does not pose an unreasonable health risk to the public.

ENFORCEMENT

LMI reviewed EPA's *1997 National Public Water System Compliance Report*[2] for pertinent qualitative and quantitative information. The following general enforcement information in this section is taken directly from that report.

> Unless there is an immediate health risk necessitating immediate action, formal enforcement actions may be initiated several months after the violation is detected and reported. The reason for the delay is that, when appropriate, states commonly undertake a variety of informal actions and compliance assistance measures to try to get PWS back into compliance as quickly as possible. Informal actions may include the following activities:
>
> - Compliance reminder letters or notices of violations (NOVs)
> - Field visits
> - Telephone calls
>
> Formal enforcement actions may include the following activities:
>
> - Bilateral compliance agreements
> - Citations
> - Administrative orders
> - Criminal complaints with penalties
> - Civil referrals to State Attorneys General or to the Department of Justice
> - Emergency orders
> - Criminal cases
> - Fines or administrative penalties
> - Other sanctions, such as denying permission for system expansion

[2] Ibid.

> In fiscal year 1997, the states issued a total of 913 formal enforcement actions, including 632 administrative orders without penalty, 220 administrative orders with penalty, 60 civil referrals, and 1 criminal referral.

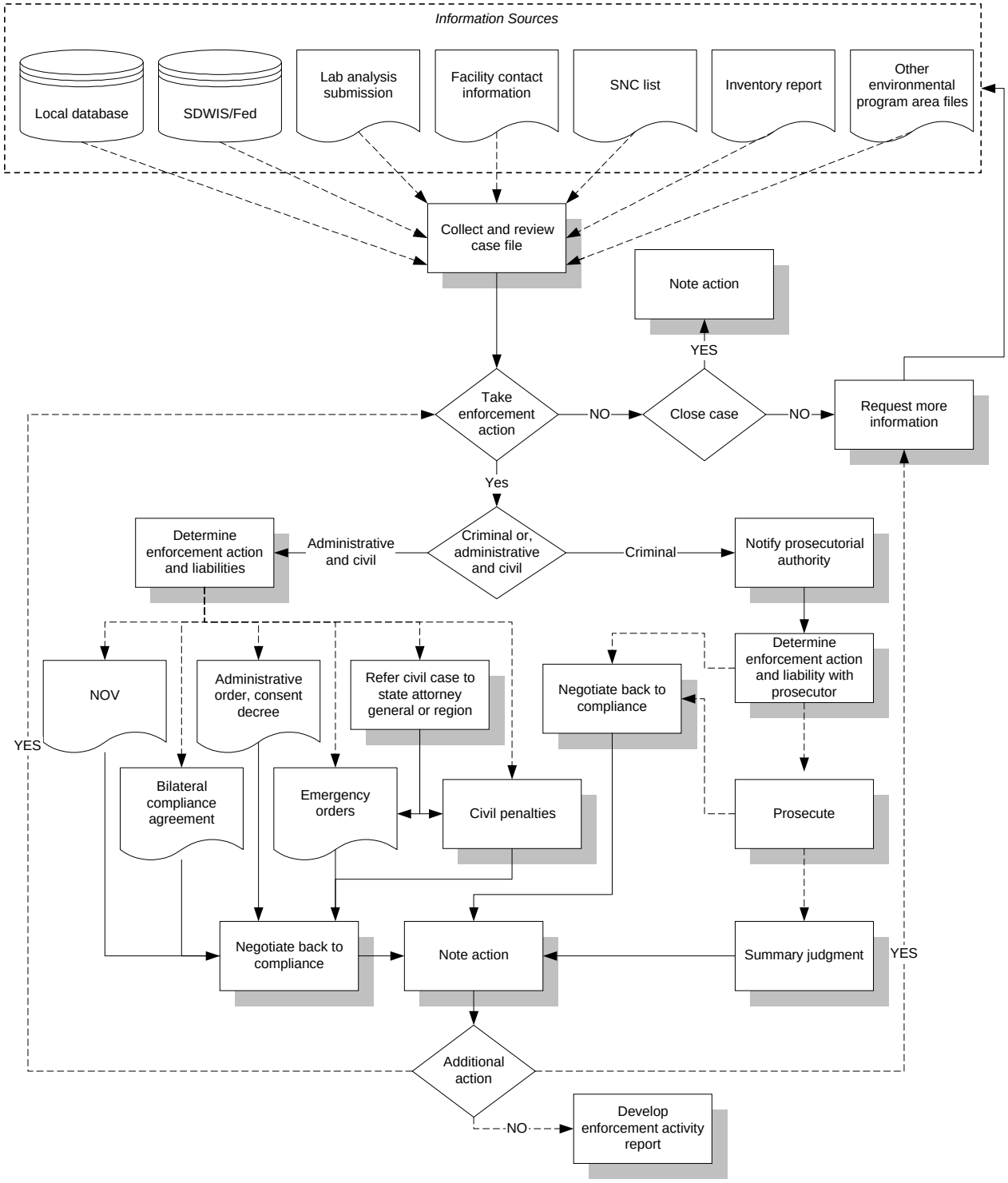
Most states have an enforcement division that is separate from the PWSS compliance division. California, unique of the states interviewed, has smaller geographical areas called districts that are responsible for enforcement. A copy of the compliance report sent to the compliance division electronically also is sent in hard copy format, with a laboratory signature, to the district office. The districts have access at all times to the compliance mainframe database, which houses the state PWSS compliance data. The districts use the mainframe database to generate standard menu-driven reports to assist in determining which PWS are not complying with MCLs and monitoring schedules.

Texas' enforcement division has a central information system that is separate from the system used by the compliance division.

Missouri sends reports regularly to its enforcement division. Reports that are sent to the enforcement division include the PWS Summary and Violation Report, the Lead and Copper Report, the preliminary unaddressed SNC list, monthly TCR violations, and quarterly, other violations.

Enforcement staff may draw on many information sources in evaluating appropriate actions, as depicted in Figure III-9-3. Besides their state's compliance information system or their own system and SDWIS/FED, the files compiled by the compliance staff give enforcement personnel a water system's history.

Figure III-9-3. State Enforcement Determination Process



The 1996 amendments to the SDWA give states the authority to impose administrative penalties to PWS in violation of the SDWA. If after reviewing the case

file, the state determines that action is necessary, the next step is to decide on an administrative, civil, or criminal course of action.

An NOV warns a facility that they are noncompliant and further action may be pending. Bilateral agreements are negotiated settlements that establish timetables and a means for a facility to return to compliance, as well as penalties for failing to honor the agreement. Administrative orders are used to encourage, or order, the facility back into compliance. Civil penalties may be levied against significant violators. An option is to forward civil cases to the state Attorney General or region to determine remedies and future penalties. PWS tend to have more violations for monitoring than for exceeding MCL limits or violating treatment techniques. Table III-9-1 shows the number of MCL violations, treatment technique violations, and significant monitoring violations. The numbers could represent multiple violations for one PWS.

Table III-9-1. 1997 Compliance Report Violations

State	MCL violations	Treatment technique violations	Significant monitoring violations
Arizona	402	23	22,015
California	177	64	109
Indiana	300	10	5,412
Missouri	417	8	1,693
Texas	398	41	796

Source: Environmental Protection Agency, *1997 National Public Water Systems Compliance Report*, April 1999.

As stated in the 1998 *Annual Compliance Report*, 38 percent of PWS in Missouri had a violation in 1998. This finding is consistent with the average for the last few years. Most violations are for monitoring, and a low percent are caused by community systems.

Texas states that slightly more than 97 percent of its PWS are violation-free.

Most Arizona violations are caused by failure to submit (41,000 in 1998) as reported in SDWIS/FED. The cause of the failure has been attributed to the lack of knowledge by the PWS of their compliance schedule. Arizona now has compiled compliance schedules for the water systems.[3] The high number of violations also has been attributed to a data disconnect in information sent from the state to SDWIS/Fed that results in an inflated number of actual non-submissions.

Table III-9-2 shows how states generate NOVs. SDWIS/STATE is capable of automatically generating NOVs for TCR data only. In general, states with custom-designed systems can generate NOVs automatically. Automatically

[3] Appendix D contains an example of Arizona's monitoring schedules, which are available on line through Arizona's Web site.

generating violation information is a useful management tool for state compliance and enforcement divisions. If this type of report must be created manually, the amount of data to review is overwhelming and violations are likely to be missed.

Table III-9-2. Generation of NOVs

	Automatically	Manual
Arizona		x
Missouri	TCR only	x
California	x	
Texas	x	
Indiana	x	

In Texas, a person reviews all automatically generated MCL violations before they are sent to a PWS. All determinations are made by the PWSS compliance staff and noted for enforcement. The enforcement division issues administrative orders, and reviews and notifies the compliance division of their actions.

Missouri's proprietary system for TCR data automatically produces NOVs and public notification documents for TCR data. Other violations are reviewed individually.

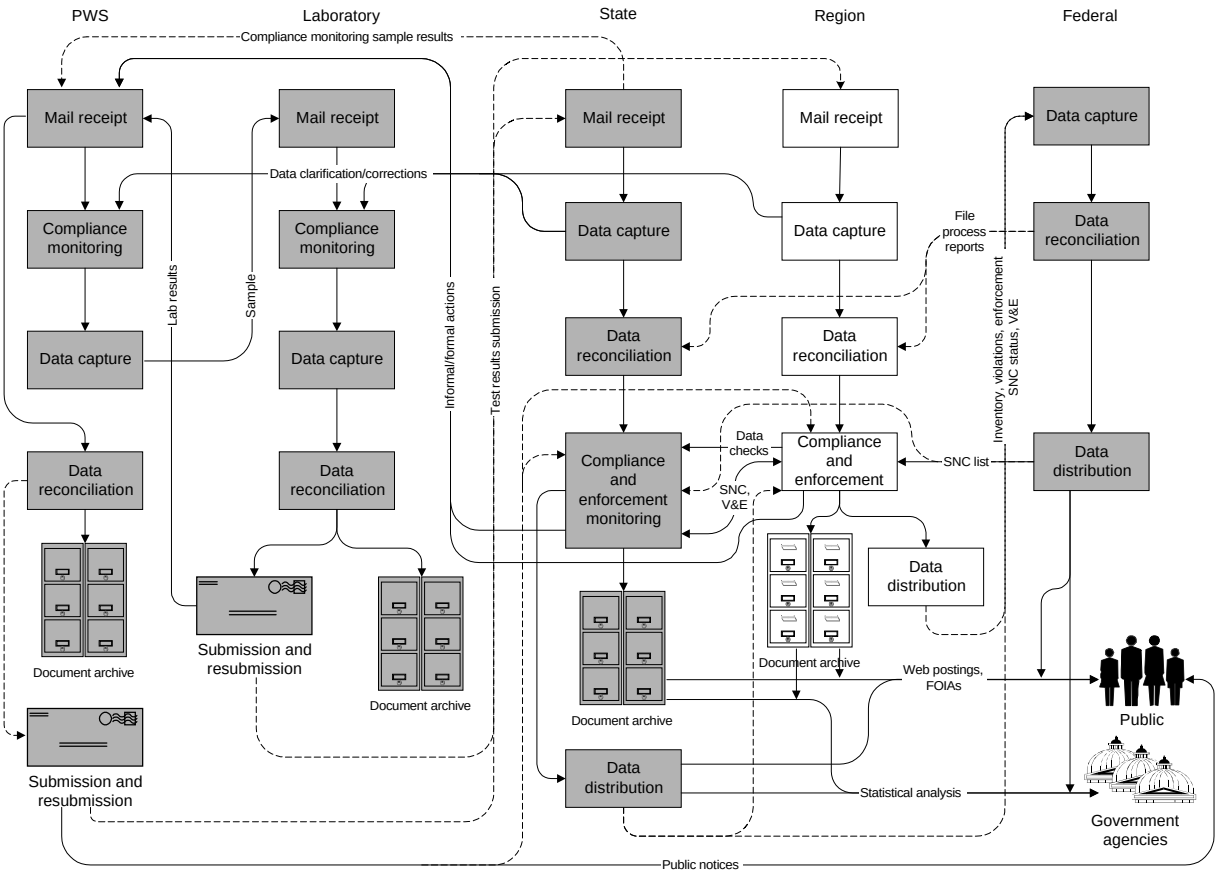
Part IV
Region

Chapter 1
Region Process Overview

In this part we describe the functions of the regions in processing PWSS data. All regions oversee the state PWSS programs. They also process submissions from water systems based on tribal lands in their region (also known as direct implementation [DI]). Only Region 8 has primacy for a state (Wyoming) and processes submissions on behalf of the state.

The non-shaded boxes in Figure IV-1-1 represent the processing of PWSS data through a region.

Figure IV-1-1. Overview of Regional Process



As overseers, some regions review the data from their primacy states before it is submitted to SDWIS/Fed. The reviews may assist states in finding potential problems, such as disassociated enforcement actions, or other problems that may

not be syntax related. The regions also help evaluate the SNC list, and requests for variances and exceptions to federal regulations.

Regions are responsible for processing data for more than 900 PWS on tribal land. More than 95 percent of water systems that report to the regions are classified as a small PWS (serving fewer than 3,300 people). These small systems are less likely to operate a certified lab and may have a more difficult time maintaining a consistent operator from year to year. For these reasons, outreach by the region is important in assisting their PWS operators with training and collecting samples for analysis.

Region 6 has 65 active systems in its DI program. The main office of Region 8 has 150 active and nearly 40 inactive water systems on tribal land and in Wyoming. An office in Montana maintains 50 tribal systems in a separate database.

Chapter 2
Region Program Management

PURPOSE

The regional program management oversees the primacy activities by states and acts as the primacy agency for PWS operating outside of primacy states to ensure compliance with federal regulations.

DESCRIPTION

As overseers, the EPA regions certify the state primacy agencies. They assist with implementing regulations and may review state data before loading it to SDWIS/FED.

To analyze data quality, EPA will audit the records of a few states. A data verification looks at the data the state has received and compares it to the contents of the state's information system as well as the federal qualifications for violation determination.

For collecting data about the Wyoming and tribal lands-based water systems, the regions process laboratory analysis data in a similar way as the primacy states. Regions identify certified laboratories that a PWS may use to process the samples. Region 6 has developed relationships with a lab in New Mexico for processing biological samples and another in Texas for processing chemical sampling. Although the regions have named certified labs, a PWS is not precluded from obtaining services from other certified labs, but the small size of the water systems often leads them to use the two labs. Region 8 maintains a sizable list of certified labs for PWS to choose from. The list describes the types of analysis the lab is certified for and is posted to the Region 8 Web site.

Chapter 3
Region Mail Receipt

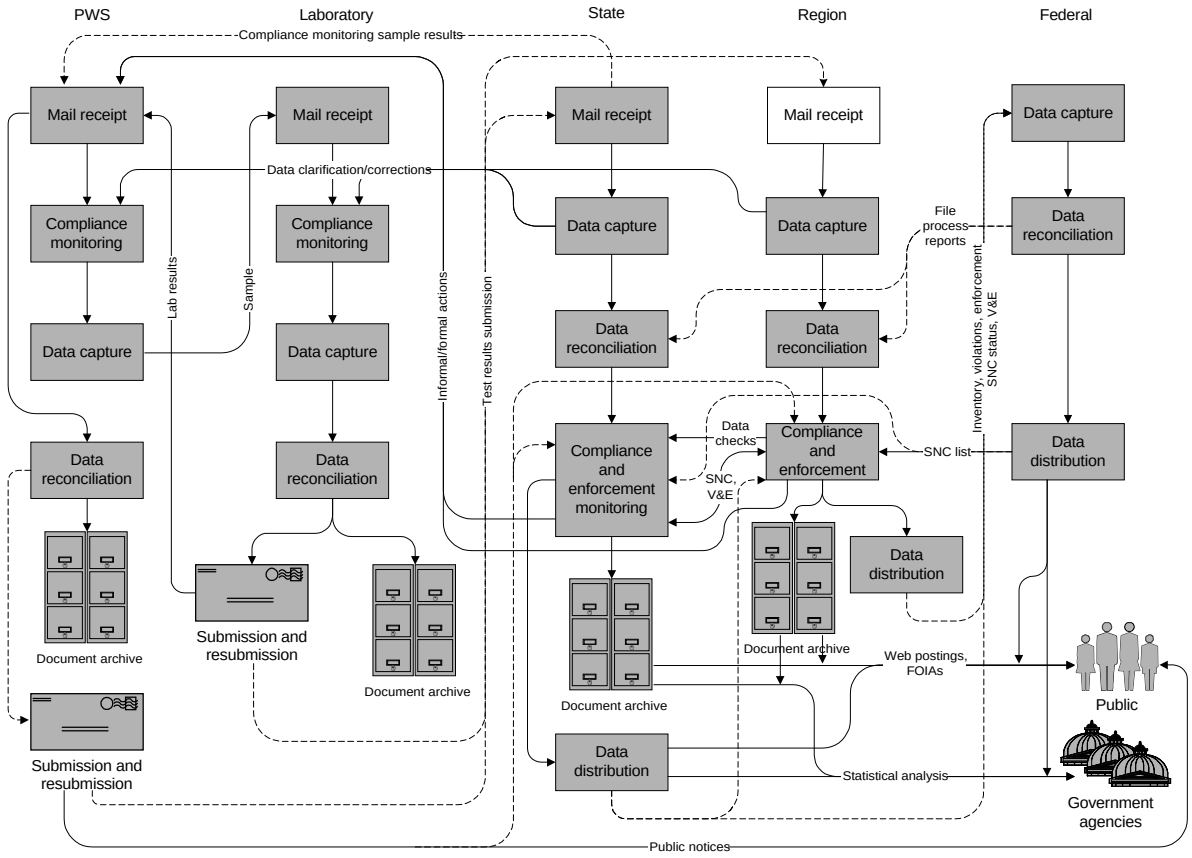
PURPOSE

The regional mail receipt ensures that incoming mail is received and processed through to responsible personnel.

DESCRIPTION

Regions may receive lab analysis related to their DI responsibilities through the mail. The regions we interviewed had different levels of hard copies. Figure IV-3-1 shows the flows through a region's mail receipt.

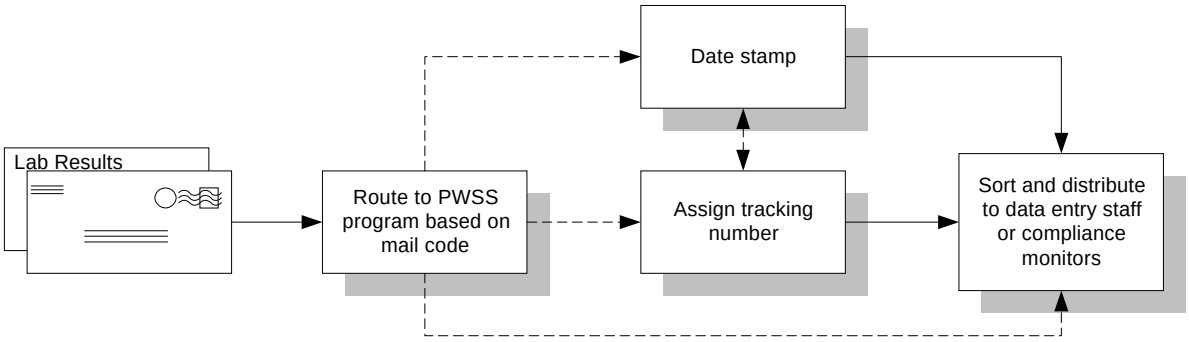
Figure IV-3-1. Region Mail Receipt in Overall Process



Mail receipt is centralized at regional offices. Intra-office mail codes indicate where to rout mail. The routing brings mail to a distribution point for the

PWSS program, where mail is further distributed to staff predominantly according to who works on the relevant rule. Figure IV-3-2 graphically depicts the possible mail receipt flow for regions.

Figure IV-3-2. Region Mail Receipt Process



Neither a date stamp nor a tracking number is applied by the central mail receipt staff. One or both may be applied once the mail is received at the PWSS office, depending on the region's procedures. Submittals that are received are not automatically acknowledged. Regions get some submissions via certified mail, which guarantees the sender an acknowledgement from the Postal Service.

SECURITY

The region typically receives analysis results that a laboratory technician signs or initials. If the PWS operator reviews the results before they are submitted to the region, the operator may sign that he or she has seen the results. When reports are received by the regions, they do not verify whether a signer is authorized to sign the report. To unwittingly sign or initial incorrect results does not carry a liability such as in the NPDES program. However, the regions consider filing false results to deceive the agencies a serious offense that can lead to enforcement action.

Regions do not have an issue with the receipt of trade or other confidential business information. However, concerns over data quality make maintaining data security until confidence in the data is reasonably assured preferable.

Chapter 4
Region Data Capture

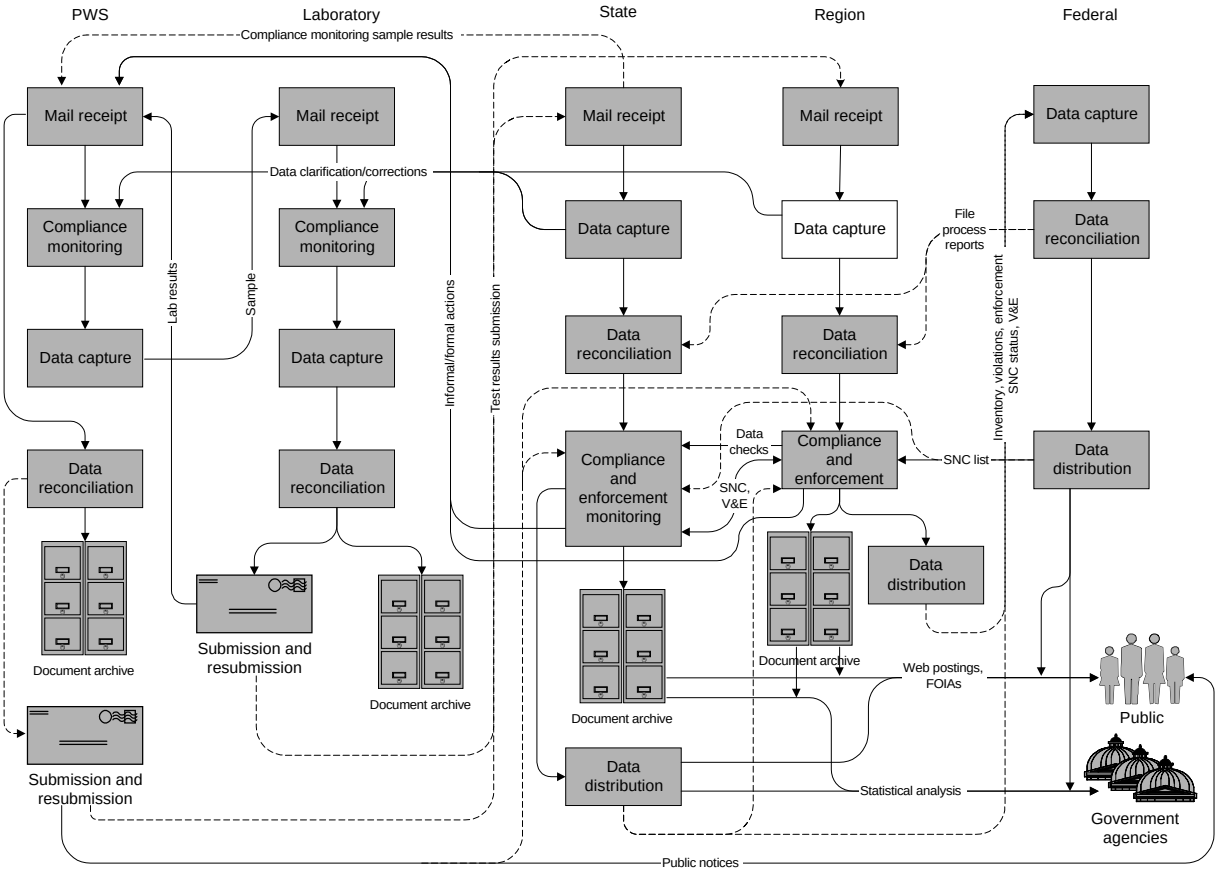
PURPOSE

The purpose of the regional data capture is to record data that water systems report to them and activities that are part of their primacy or oversight roles.

DESCRIPTION

Figure IV-4-1 shows how the region's data capture fits in with the PWSS. The data capture for regions is shown in non-shaded box in the figure.

Figure IV-4-1. Region Data Capture in Overall Process



In Region 8, the submissions are distributed in the PWSS program according to the relevant rule. Sometimes the compliance staff may be responsible for

entering the submission, but they also use dedicated entry staff who likewise focus on entering data for specific rules. Region 8 enters submissions into its own information system and SDWIS/STATE. The clerks are not allowed to correct or modify submissions. If a clerk suspects an error, or receives a submission that cannot be processed, he or she brings it to the attention of a compliance staff member who can better assess necessary actions.

The hard copy submissions received by Region 6 are predominantly processed by their data coordinator and three senior environmental employees. The entry staff use Excel and printed spreadsheets to track submission processing. Region 6 receives some data electronically straight from the labs, but this only covers 10 of the 21 tribes in the DI program.

Chapter 5
Region Data Reconciliation

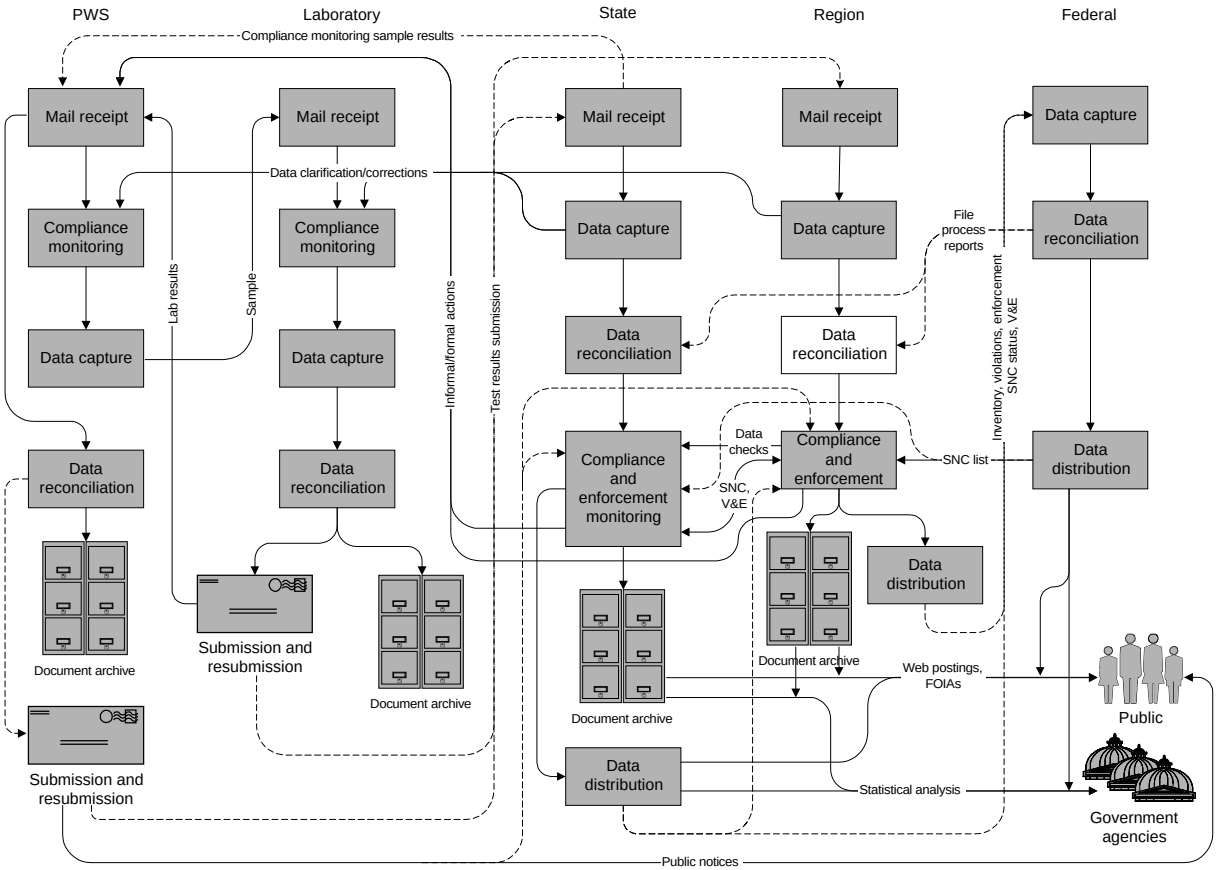
PURPOSE

The regional data reconciliation verifies and corrects errors in data for the submissions they process.

DESCRIPTION

The compliance staff review keyed and transmitted data for data quality. Figure IV-5-1 depicts the data reconciliation in the overall process flow. Data reconciliation is shown as the non-shaded box in the figure.

Figure IV-5-1. Region Data Reconciliation in Overall Process



The regions we talked with have their compliance staff and locally developed information systems to review data. Keyed data are validated for acceptable values by the information system during data entry. The compliance staff will review the data entry as part of their compliance check. The review by compliance staff generally is distributed according to which PWSS rule a staff member may be assigned. Region 6 runs its own queries of its mainframe to search for “odd ball” data.

After data have been distributed to the EPA information system, SDWIS/FED, the region receives an error report. The error report may be checked against submissions to rectify discrepancies. The report is sent in a format that regions can print out and distribute to staff. Data quality also is checked against SDWIS/FED in annual or semiannual internal audits and by external data verification audits.

Chapter 6
Region Data Archiving

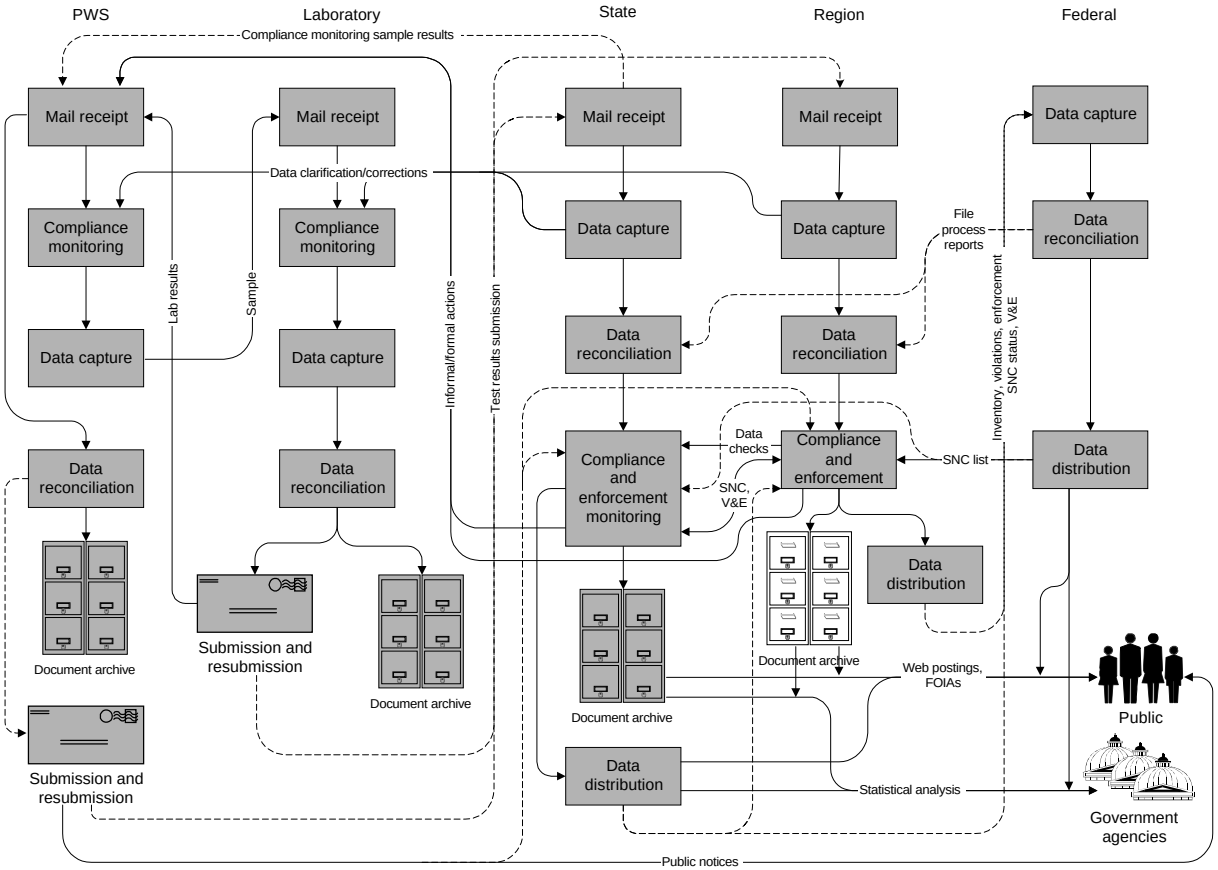
PURPOSE

The regional data archiving facilitates maintaining and storing accurate records of data to comply with regulatory retention requirements.

DESCRIPTION

The regions maintain files relevant to submissions, inventories, variances, and exemptions for the requisite record-retention periods. Figure IV-6-1 represents the region's document archiving in the overall process flow.

Figure IV-6-1. Region Data Archiving in Overall Process



In general, files are maintained on site. Region 8 uses the region's common records center to maintain PWSS files. All Region 8 PWSS records before 1990 have been converted to microfilm. In Region 6, files are maintained in the program office space. The last archiving of Region 6 files was in 1993.

Regions have the same record retention requirements as the state primacy agencies for the data they have primacy over. Table IV-6-1 shows the regulatory retention requirements. Regions maintain hard copy files on site for the required periods and then remove them to the regional archives. Regions 6 and 8 have been maintaining electronic records indefinitely. Region 8 backs up their electronic records weekly.

Table IV-6-1. Regional Direct Implementation Record Retention Requirements

Requirement	Minimum record retention period
Microbiological analyses	Not less than 1 year
Records of analyses for other than microbiological contaminants	Not less than 40 years (may be transferred to EPA after 10 years)
Current inventory records of PWS	Not less than 12 years
Reports of sanitary surveys	Not less than 12 years
Records of state approvals	Not less than 12 years
Records of enforcement actions	Not less than 12 years
Records concerning granted variance or exemption	Not less than 5 years after expiration of variance or exemption

Regions also maintain documentation about their oversight role. Much of this documentation is related to compliance and enforcement activities. To date, these data have been maintained indefinitely either on site or in regional archives.

Chapter 7
Region Data Distribution

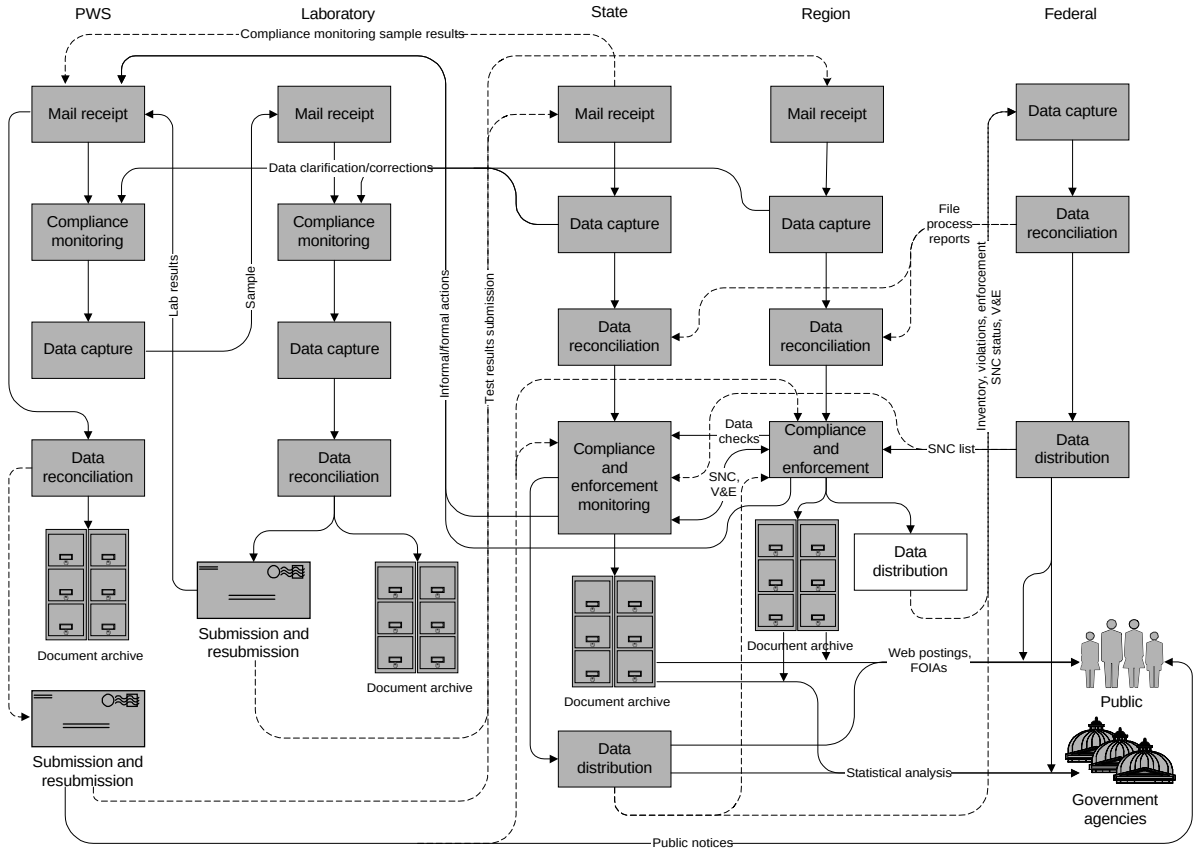
PURPOSE

The regional data distribution process ensures that DI data are completely represented in SDWIS/FED.

DESCRIPTION

Data entered into the region's information system that shows a violation, enforcement actions, and granted variances and exemptions are converted into the DTF format and transmitted to SDWIS/FED each quarter. Inventory data about PWS is sent annually. Figure IV-7-1 depicts output from regions to SDWIS/FED. The data distribution is shown in the figure as a non-shaded box.

Figure IV-7-1. Region Data Output in Overall Process



Although most data are required quarterly, it may be corrected at any time. In general, regions will send corrections to SDWIS/FED with their quarterly update. The DTF format is created either in the SDWIS/STATE or by re-keying data through DTF Writer.

Regions also may generate ad hoc reports that identify effects of rules for their DI program and oversight reports of state outliers that may need to be analyzed further.

Chapter 8
Region Information System

Regions, in a primacy and oversight roles, use the information systems to determine compliance. Regions are not required to use SDWIS/STATE for capturing submissions, but they must roll up their data to SDWIS/FED the same way that states do.

Region 6 uses spreadsheets and an Access database to track reporting schedules. Results data are captured in SDWIS/STATE, which is the region's database of record. If the SDWIS/State cannot determine violations, the violations are keyed into DTFWriter to generate the DTF for SDWIS/FED. As the overseer, Region 6 would like to be able to review data remotely with State primacy agencies that use SDWIS/STATE.

In Region 8, DI data are keyed into a local database called the Compliance Tracking System (CTS). CTS is programmed in Dbase and maintained by a member of the region's information systems support staff. The Region 8 field office in Montana used a separate version of the software. Data also are entered into SDWIS/STATE so the DTF file can be generated for upload to SDWIS/FED. Although Region 8 staff review all state data before uploading it to SDWIS/FED, they review the file on the EPA mainframe where SDWIS/FED is located.

Information systems other than SDWIS/STATE have been used because of the need for greater compliance checking and preferences for current entry interfaces. Future releases of SDWIS/STATE may reduce the need for additional compliance checking.

Regional enforcement staff use a separate database to track their activities. The Compliance Action Tracking System (CATS) covers compliance functions for multiple EPA programs. Although enforcement staff are assigned to focus on a particular program, they are not part of the program offices they are assigned to. By using CATS, problems of synchronizing the system with the PWSS information systems can arise. Improper compliance data in the PWSS information system can cause errors in resolving violations in the PWSS system and, ultimately, in SDWIS/FED.

Chapter 9
Region Compliance and Enforcement

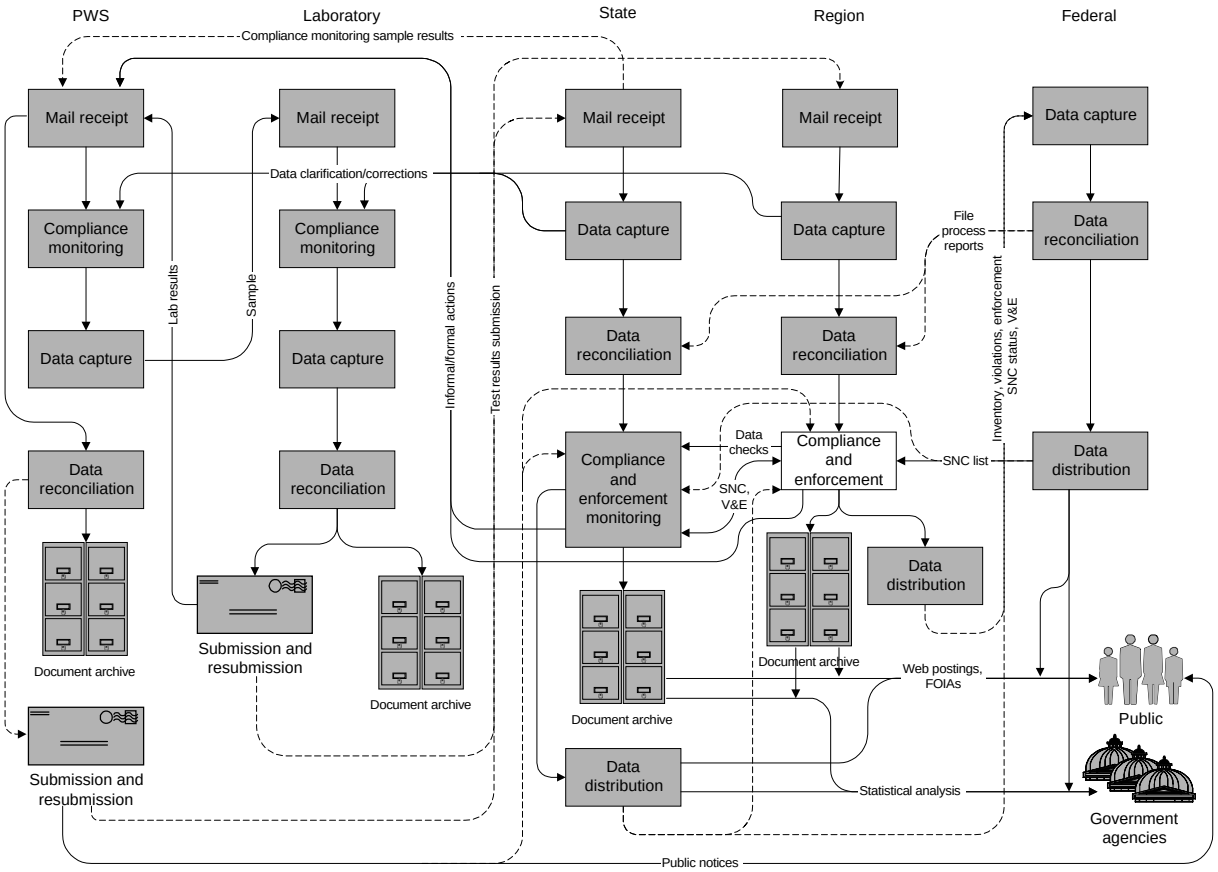
PURPOSE

The regional compliance and enforcement ensures the compliance of direct submitters and oversees PWSS programs in the primacy states.

DESCRIPTION

Regional compliance and enforcement back up primacy states and oversees the implementation of regulations in Wyoming and tribal lands. Figure IV-9-1 shows the flow of data to the compliance and enforcement activities of a region. The non-shaded box in the figure represents compliance and enforcement.

Figure IV-9-1. Region Compliance and Enforcement in Overall Process

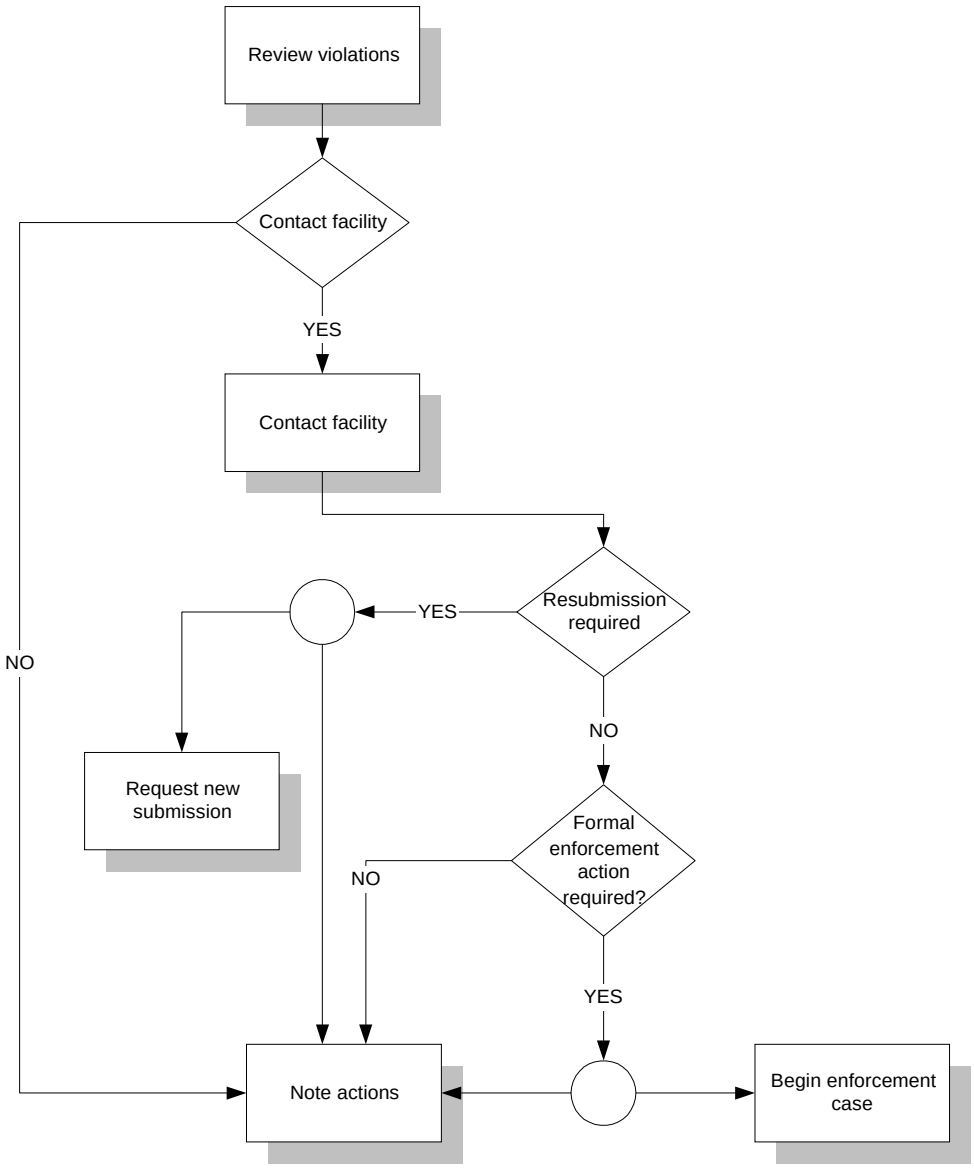


Compliance

The timeliness and accuracy of sample data is a major issue for regional compliance staff. Many of the water systems under the regions' DI programs have high turnover rates for operators. The high turnover has caused regions to commit resources for continuous educational and monitoring activities to help the new operators.

Regions provide sampling schedules and may contact water systems to check up on their sampling activities. Compliance staff also review water system data to find noncompliance. Figure IV-9-2 shows the process that compliance staff use for their reviews.

Figure IV-9-2. Region Compliance Review Process



The data that the region staff are reviewing may need to be clarified by the facility or the testing lab so the staff can determine the nature of violations and what actions may be necessary to correct the violation. For example, the compliance staff may need another sample or could simply evaluate the need for enforcement action. The staff's decisions are noted and kept with the facility's records.

As many as half of the states send their data to the regions for review before it is uploaded to SDWIS/FED. For example, in Region 8 the states upload their data to a directory on the mainframe at RTP, where SDWIS/FED is located. The state then notifies the region of the file's availability and assigned name. The region reviews the file and determines if they might want to bring issues to the state's attention before the file is processed into SDWIS/FED. The regions may look for problems, such as proper data assignments to input fields.

PWS not in a primacy state may request that the region grant them a variance or exemption from their normal reporting requirements. The region also must review the states' practices of granting variances and exceptions to PWS. Each quarter, the state must justify to the region each variance and exception they granted. The state must show that granting the request was necessary and does not pose an unreasonable health risk.

Enforcement

In general, members of the Office of Compliance and Enforcement Assurance (OECA) act on regional enforcement activities. OECA has a number of tools and options available for deciding how best to make a noncompliant water system to compliance. One region indicated that in recent years enforcement actions have fluctuated anywhere from 30 to 200 a year. Figure IV-9-3 shows the general method for determining enforcement activities. In 1997, EPA issued 266 notices of violation, 392 federal administrative orders, 12 complaints for penalty, and 4 referrals for civil judicial action.[1]

Quarterly, SDWIS/FED provides the region with the SNC list for water systems that have been out of compliance for at least two consecutive quarters. The region must determine if the systems on the SNC are there in error, are taking corrective action, or require some form of enforcement action.

Enforcement staff may draw on many information sources in evaluating appropriate actions. Besides their own information system and SDWIS/FED, the enforcement staff use files of a water system's history that has been compiled by the compliance staff. If after reviewing the case file, the enforcement staff determines that action is necessary, the next step is to decide on an administrative, civil, or criminal course of action.

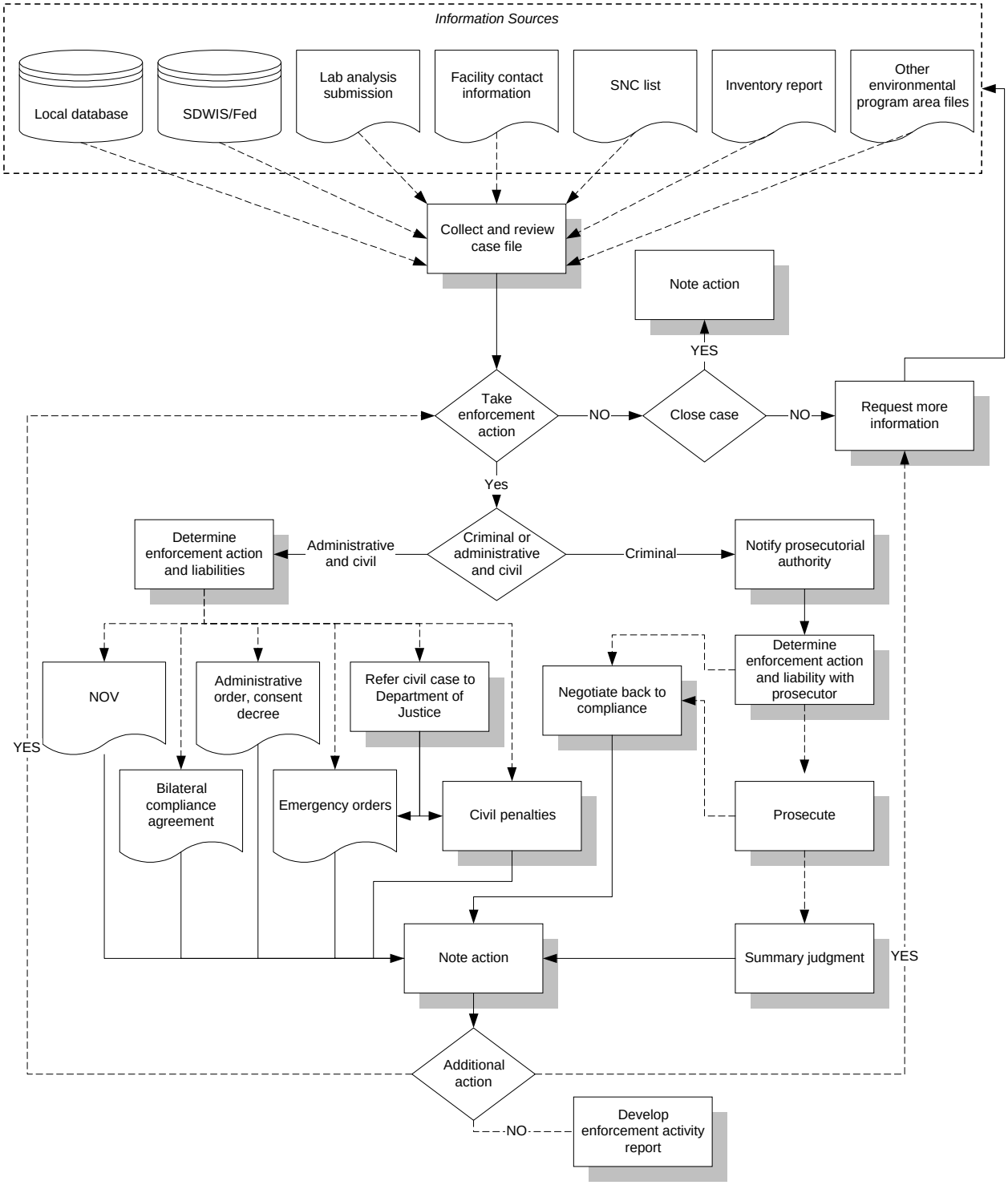
[1] Environmental Protection Agency, *1997 National Public Water Systems Compliance Report*, April 1999, p. 20.

An NOV warns a facility that they are noncompliant and that further action may be pending. The enforcement staff use administrative orders to encourage, or order, the facility into compliance. Bilateral agreements are negotiated settlements that establish timetables and or a means for a facility to return to compliance, as well as penalties for failing to honor the agreement. Civil penalties may be levied against significant violators. The enforcement staff have the option of forwarding civil cases to the U.S. Department of Justice to determine remedies and future penalties.

Criminal cases are not common. Before a judgement is issued, the parties may settle on a course of action for ensuring that PWS returns to compliance or maintains compliance.

The actions taken by the enforcement staff are recorded in the Formal Enforcement Tracking System (FETS). For enforcement actions to be recorded in the PWSS program database, either the enforcement staff are given access or the actions are communicated back to the compliance officers to enter into the system.

Figure IV-9-3. Region Enforcement Determination Process



Part V

Federal

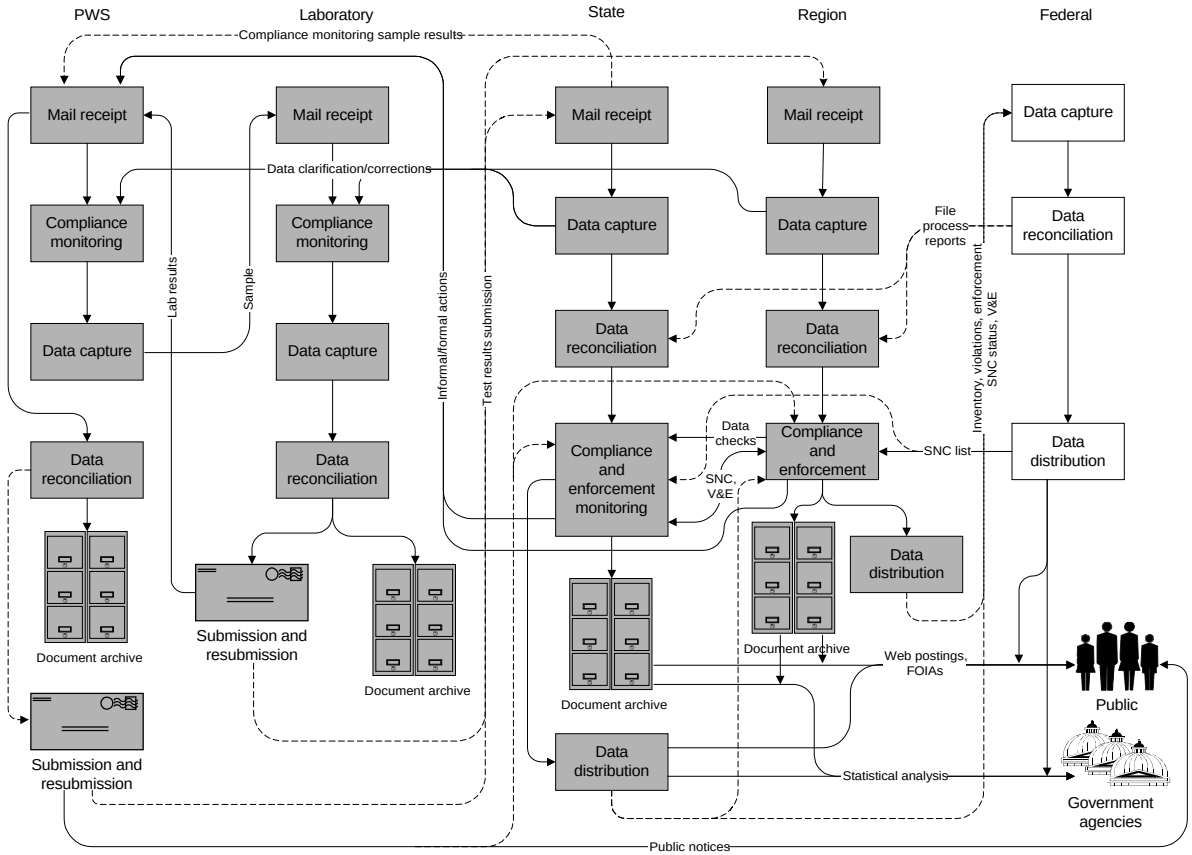
Chapter 1
Overview of the Federal Process

In this part, we describe the functions of EPA headquarters in processing of PWSS data. Each primacy agency informs EPA of violations of federal regulations by transferring the violation data to EPA's national information system. The national information system for the PWSS program is the SDWIS/FED.

Because primacy is delegated to most states and a few regions for this program area, EPA HQ only receives violation, inventory, and enforcement data, and some sample result data for unregulated contaminants. Because the data are received electronically, EPA HQ does not have mail receipt or data archiving, as the other participants in the PWSS do. EPA compliance and enforcement issues are addressed in Chapter 9 of Part IV.

The non-shaded boxes in Figure V-1-1 show the steps in the federal processing of PWSS data.

Figure V-1-1. Federal Process Overview



SDWIS/FED is updated quarterly with the primacy agency's violation data and annually with the inventory data. Although the updates and edits arrive steadily, EPA HQ gets a heavy volume of files to be processed for about 30 days towards the end of each quarter.

In 1999, EPA made available 1996 and 1997 national compliance report data. Using an average number of reported violations from the 1996-1997 state and regional data, we estimate that the SDWIS/FED processes approximately 337,346 violations and inventory submissions annually. Table V-1-1 shows the figures we used to estimate the annual submissions.

Table V-1-1. Annual Submissions of Inventory and Violations

	Number of PWS	Number of violations	Number of inventory and violation submissions
1996	167,156	168,823	335,979
1997	172,821	165,891	338,712
Average	169,989	167,357	337,346

In 1997, SDWIS/FED recorded 97,661 MCL, treatment and technique, and significant monitoring and reporting violations.[1] However, the violations compiled by EPA from state and regional data for that year was 165,891 (See Appendix A). Data validation audits of primacy agencies have shown serious under- and over-reporting of violations to SDWIS/FED. EPA is working to assist primacy agencies with properly identifying and reporting violations.

The majority of violations reported are failures of PWS to monitor and report sampling results. According to the 1997 SDWIS/FED data, 85 percent of the violations were monitoring and reporting violations. According to the compiled state and region reported numbers, monitoring and reporting violations accounted for 90 percent (149,660) of violations. These percentages are in line with the 1996 data.

The transmitted files also may include records of compliance and enforcement actions taken in response to violations and unregulated sampling data forwarded by states. Also, information from 1998 indicates that 20 percent of transmitted records were modifications of existing data.[2]

[1] *1997 National Public Water Systems Compliance Report*, U.S. EPA, 1999.

[2] *Analysis of SDWIS Data Quality*, prepared for the EPA Data Reliability Work Group, August 1999.

Chapter 2
Federal Program Management

PURPOSE

The federal program management manages the national information system and assists with accurately collecting data from primacy agencies. The data collected includes information about violations, enforcement actions, sanitary surveys, and sample results for unregulated contaminants. The data are used to assist in evaluating and developing federal drinking water regulations.

DESCRIPTION

As part of the Government Performance Requirement Act (GPRA), EPA evaluates its performance in all program areas, including the PWSS program. The quality of data in SDWIS/FED is important for accurately picturing EPA's overall performance and, specifically, PWS compliance.

To measure its performance, EPA selects a group of states and regions each year in which to audit the validity of the data. These audits evaluate the accuracy of data provided to SDWIS/FED when compared with data in state and regional database. Discrepancies can occur from interpretations of monitoring violations as well as problems in properly identifying and conveying data from the state or regional systems to SDWIS/FED.

A 1999 EPA report indicates that the quality of the data in SDWIS/FED needs to be better controlled. To improve the quality of SDWIS/FED data, EPA has been working with the Association of State Drinking Water Administrators (ASDWA) to develop a quality assurance and control manual. The manual defines SOPs that aim to ensure the accuracy, completeness, consistency, and timeliness of data submitted to SDWIS/FED.

EPA HQ also provides training about communicating data to SDWIS/FED and reconciling state and federal data to improve data quality.

Chapter 3
Federal Mail Receipt

[Mail receipt is not depicted as part of the data process flow for the PWSS program at the Federal level. This chapter is inserted as a place holder for congruency of the BPA structure.]

Chapter 4
Federal Data Capture

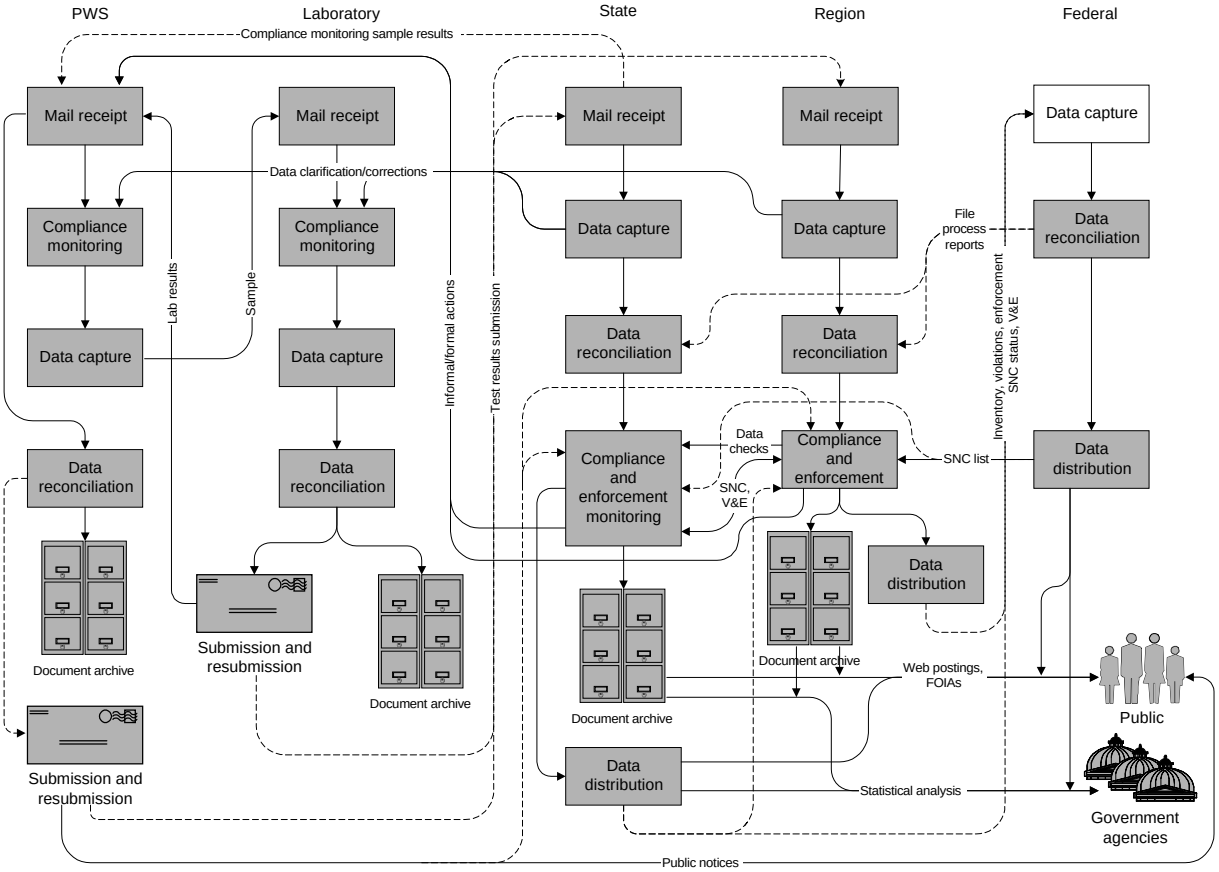
PURPOSE

The purpose of the federal data capture is to capture data uploaded by the primacy agencies to SDWIS/FED.

DESCRIPTION

EPA headquarters requires that each primacy agency upload violation data quarterly. The production control staff process approximately 400 to 500 files into SDWIS/FED each quarter. Figure V-4-1 depicts the data capture in the overall process flow.

Figure V-4-1. Federal Data Capture in Overall Process



EPA requires that violation data be submitted to SDWIS/FED within 60 days of the end of the calendar quarter. Ninety days after the end of the quarter, states and regions are to have completed reviewing the data in SDWIS/FED and made corrections. The states and regions are required to report compliance and enforcement data within 45 days of the end of each fiscal quarter and inventory data once a year.

The primacy agencies prepare their data for upload by mapping it to the DTF. DTF consists of column card-type records. The primacy agency compiles the records into a file with a unique name and uploads it to an EPA National Computer Center (NCC) mainframe at Research Triangle Park, North Carolina. Files may be moved by FTP or Internet connections. The file is uploaded to a directory on the server and waits to be processed by the SDWIS/FED.

The states and regions coordinate to decide if the data will be reviewed by the region before it is entered into SDWIS/FED. If the region does review state data, the states may forward the data to the region directly or notify the region of the name and directory of the file on the NCC mainframe. Regardless of the process agreed to by a state and region, the process must result in the data being provided to SDWIS/FED no later than 60 days after the quarter.

Because regions may review the files held at NCC, SDWIS/FED does not automatically search directories for files to be processed. Once a file is ready for processing, either the state or region must contact a member of the production control staff and notify them that the file is ready for processing. The notification may be by phone or e-mail and must provide details, such as the file's name and directory location. The production control staff may take a few minutes to check the file for syntactical problems and may break up large files into more manageable parts. Then the staff member directs SDWIS/FED to process the file by using the Job Control Language module on the mainframe.

If the DTF indicates that the file is to be processed as a 'traditional' load, SDWIS/FED will delete, insert, or modify targeted records as defined in the input file. A 'total replacement' load will identify the changes that need to be made and process the changes.

DTF files are processed in the order in which they are received. To reduce the possibility for errors, the DTF transactions in each file are sorted for processing according to DTF type (i.e., inventory, violation data, enforcement data, variance and exemption data, and sample data). If DTF type transactions are sent in separate files, the files need to be presented to SDWIS/FED for processing in the same order in which they would appear if they were in one file. During a traditional update, the batch sequence number of each DTF transaction is the key to sorting the transactions.

When feasible, production control will hold files that require significant processing time to run on weekends when rates lower. Maximum turnaround time may be one week.

Chapter 5
Federal Data Reconciliation

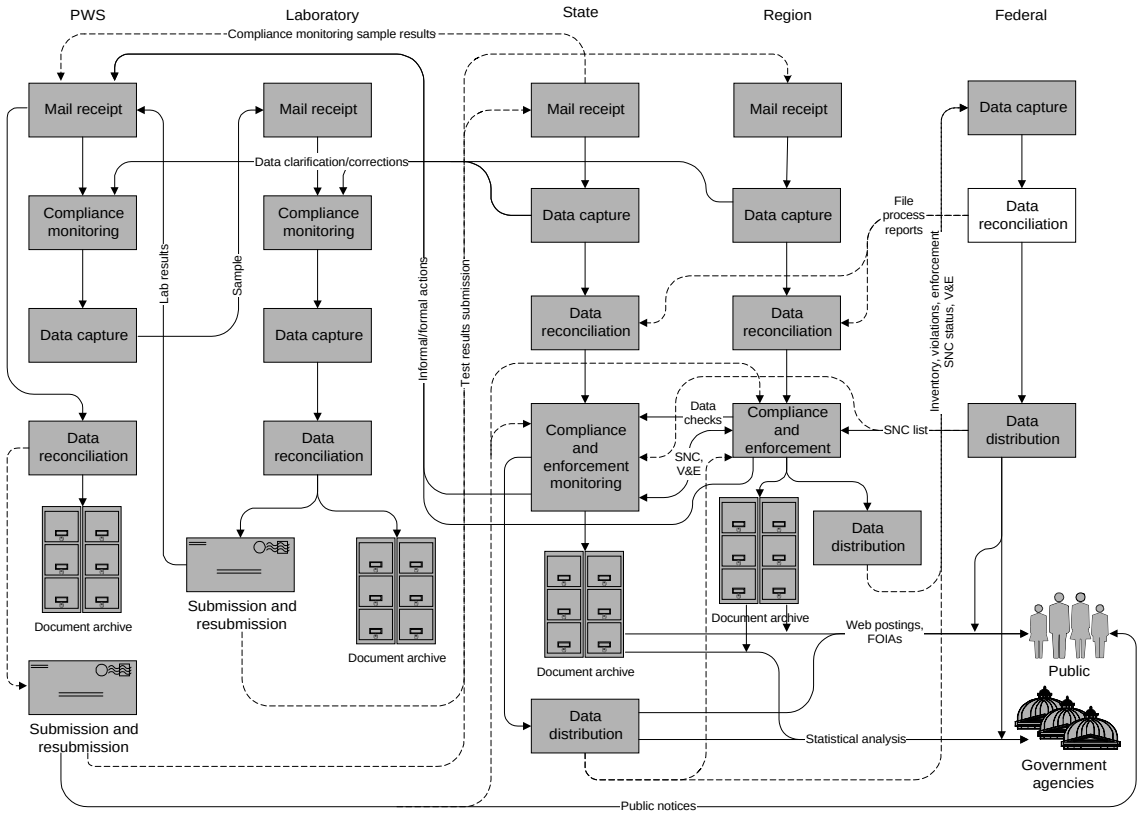
PURPOSE

The federal data reconciliation verifies and corrects potential errors in the data sent to SDWIS/FED by states and regions.

DESCRIPTION

After the SDWIS/FED has processed a file, the system generates three reports: an edit/update report, a human-readable error report, and the same error report coded in DTF. Arrangements made with the EPA production and control staff determine how the reports are delivered to the primacy agency. Figure V-5-1 depicts the data reconciliation in the overall process flow. Data reconciliation is shown as an non-shaded box in the figure.

Figure V-5-1. Federal Data Reconciliation in Overall Process



The edit/update report summarizes SDWIS/FED's ability to process the file. Included in the edit/update report are statistics on the status of SDWIS/FED before and after processing, as well as a summary of error conditions that appear in the error reports.

The error reports detail each error encountered during processing according to a standard list of errors in the error code file. The error code file for SDWIS/FED contains 900 possible error-type identifications. By matching the human-readable and DTF error reports, primacy agencies can identify changes to make to the DTF version. The corrected DTF records can then be sent back to NCC for processing into SDWIS/FED. The target is to have SDWIS/FED data corrected with 90 days after the end of the quarter to which the data relates. As an alternative, the data submitter can make corrections to their own data system and create the correct transactions.

SDWIS/FED also generates a daily production log each night that shows what jobs were run that day and the percentage of errors for each job. Primacy agencies can request the daily production log to follow when jobs are run and evaluate the level of errors in their files.

EPA has worked with stakeholders to identify common errors and develop guidance documents with the hope of addressing and reducing these errors. EPA's evaluation of SDWIS data found numerous occurrence of errors.[1] One document in development focuses on nine common errors and suggests SOPs that may catch the errors before the data leaves the primacy agency.[2]

[1] *Analysis of SDWIS Data Quality*, 1999, EPA.

[2] *State Data Management Quality Assurance Manual, Model Standard Operating Procedures*, Draft 1999, ASDWA/EPA.

Chapter 6
Federal Data Archiving

[Data archiving is not depicted as part of the data process flow for the PWSS program at the federal level. This chapter is inserted as a place holder for congruency of the BPA structure.]

Chapter 7
Federal Data Distribution

PURPOSE

The federal data distribution provides data from SDWIS/FED for review by stakeholders, policy makers, and the public.

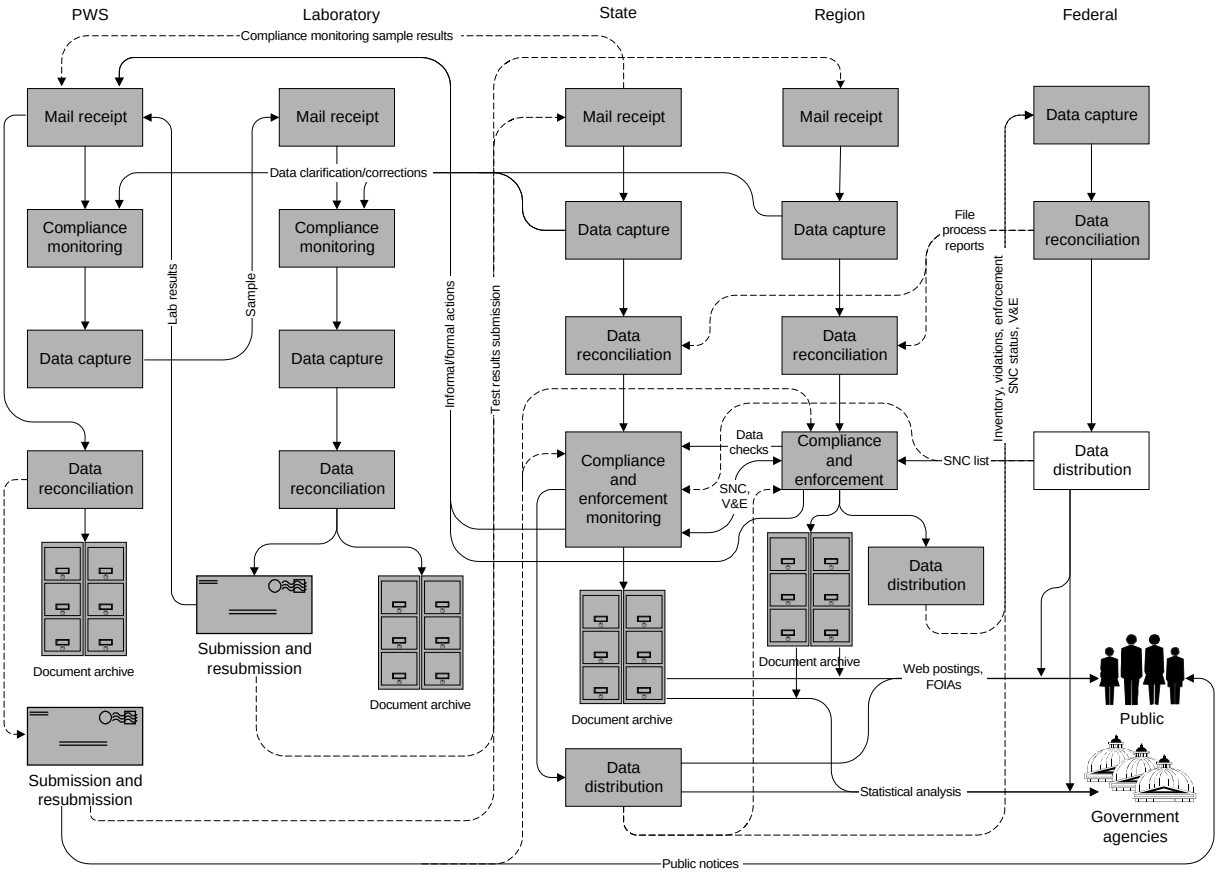
DESCRIPTION

EPA generates a preliminary SNC list from SDWIS/FED approximately 20 days before the end of the reporting period. The SNC list identifies PWS whose violations, covering four quarters, the primacy agency must ensure are correct. A final SNC report is generated immediately following after the reporting period closes. Federal involvement in resolving SNC is covered in Part IV, Chapter 9, Compliance and Enforcement.

Two to three days after the end of the reporting period, data is extracted from SDWIS/FED and replicated in EPA's EnviroFacts database for public access. The public may query the EnviroFacts data or request FOIA output.

The OGWDW can generate reports from SDWIS/FED to monitor the state of the PWSS program. SDWIS/FED data are used for determining how well water systems are protecting the quality of the public water supply and what modifications and additions should be made to the list of regulated contaminants. The primacy agencies may log into SDWIS/FED to generate one of the 15 standard detailed and summary reports in the system. They also may perform ad hoc queries of the database. Figure V-7-1 depicts the distribution of data from SDWIS/FED. The federal data distribution is shown in the figure as the non-shaded box.

Figure V-7-1. Region Data Distribution in Overall Process



Chapter 8
Federal Information System

SDWIS/FED is a dB2 database operating on an IBM 9000 mainframe at the NCC. SDWIS/FED holds data about 370,000 water systems, dating to 1980, although roughly 170,000 of those are still operating. There are two categories for PWSs in SDWIS/FED:

- Active: currently operating,
- Inactive: ceased operating.

A PWS may be considered inactive if it ceased operations entirely or, by being acquired, ceased operating as an independent entity.

The predecessor to SDWIS/FED, Federal Data Reporting System (FRDS), processed incoming data files as 80-column card-formatted data. SDWIS/FED inherited the FRDS's data processing architecture, DTF. States can program their proprietary systems for DTF, but have expressed interest in a more relational format as well as their desire to make corrections in SDWIS/FED interactively.

DTF consists of a number of file types. The files are structured as depicted in Table V-8-1.

Table V-8-1. DTF File Structure

Positions	Definition	Note
1-2	Form ID	DTF data capture form type
3-11	Qualifier 1	The PWS identification
12-18	Qualifier 2	User- or system-generated secondary qualifiers to distinguish multiple records
19-25	Qualifier 3	User- or system-generated secondary qualifiers to distinguish multiple records
26	Action code	Delete, insert, or modify
27-31	Data element number	SDWIS data element identification number
32-71	Data value	Value for the data element
72-74	Reserved for SDWIS/Fed	
75-80	Batch sequence number	Order for duplicate transaction processing

One method of updating SDWIS/FED is by totally replacing existing records even if only a small part of the data is modified. Total replacement transactions made up 12 percent of all transactions. SDWIS/FED is capable of supporting open

database connectivity (ODBC) through an Oracle gateway. But using ODBC would require that the primacy agency develop its own front end.

Some of the PWS we interviewed expressed their concern that the data reflected at the federal level is not sufficiently reliable to be used for overseeing compliance. PWS have gone to Envirofacts and have noted that the extracted data from SDWIS/FED on their system is incorrect.

Chapter 9
Federal Compliance Monitoring

[Compliance monitoring is not depicted as part of the data process flow for the PWSS program at the federal level. This chapter is inserted as a place holder for congruency of the BPA structure.]

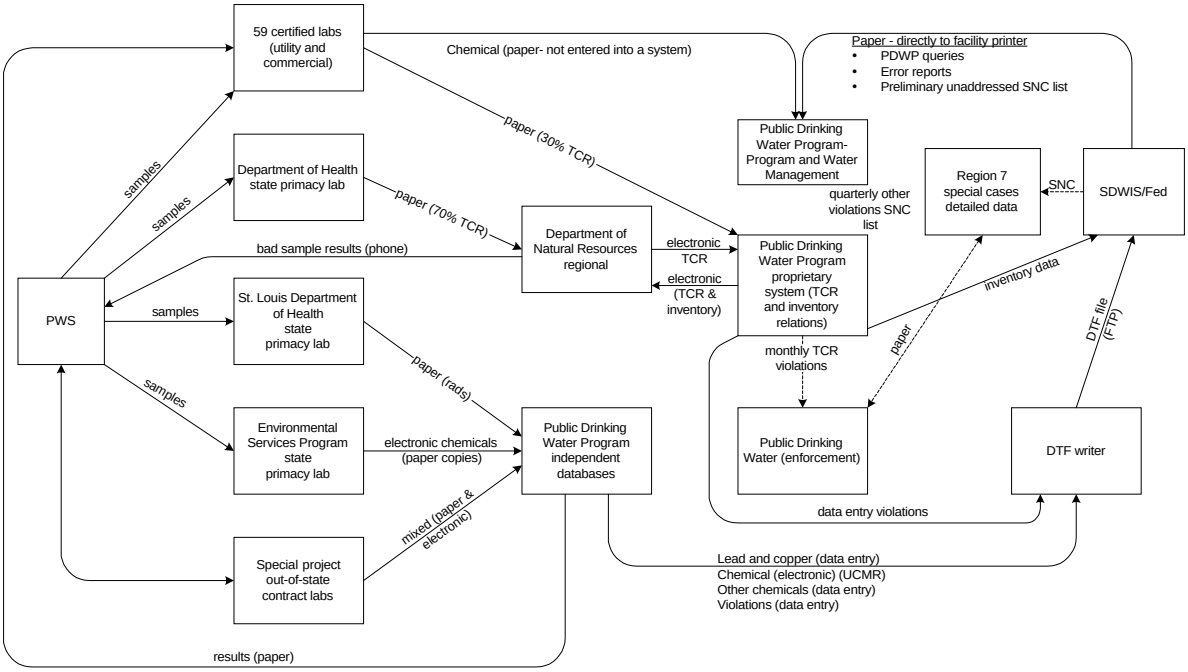
Appendix A
Annual Compliance Data

The following table is a compilation of state-reported violations published in the 1996 and 1997 annual compliance reports issued by the EPA.

	VIOLATIONS											
	1996					1997						
STATE	PWSs	MCL	TT	M/R	TOTAL	PWSs	MCL	TT	M/R	TOTAL	AVG.	TREND
Alabama	762	47	14	474	535	770	38	4	283	325	430	-210
Alaska	1635	49	321	5503	5873	1695	56	346	4463	4865	5369	-1008
Am. Samoa	21	79	14	47	140	21	0	14	0	14	77	-126
Arizona	1688	423	31	17728	18182	*1688*	402	23	22015	22440	20311	4258
Arkansas	1151	94	70	501	665	1264	87	88	394	569	617	-96
California	8595	365	78	470	913	8688	177	64	109	350	631.5	-563
Colorado	2182	111	71	638	820	2217	84	57	581	722	771	-98
Connecticut	4460	163	14	510	687	4619	98	12	2803	2913	1800	2226
Delaware	564	98	0	84	182	563	91	1	55	147	164.5	-35
Dist. Of Columbia	2	3	0	0	3	2	0	0	0	0	1.5	-3
Florida	6958	248	1	1456	1705	7000	375	1	1534	1910	1807.5	205
Georgia	2514	209	0	1080	1289	*2514*	182	0	981	1163	1226	-126
Guam	10	0	0	0	0	12	0	0	0	0	0	0
Hawaii	144	10	128	5	143	144	5	114	4	123	133	-20
Idaho	2018	422	336	2158	2916	2088	403	291	1510	2204	2560	-712
Illinois	6051	451	42	5138	5631	6061	407	14	3266	3687	4659	-1944
Indiana	4505	324	7	4628	4959	4287	300	10	5412	5722	5340.5	763
Iowa	1939	219	45	172	436	1920	195	18	138	351	393.5	-85
Kansas	1095	186	33	144	363	1122	166	25	155	346	354.5	-17
Kentucky	718	59	50	286	395	728	58	38	226	322	358.5	-73
Louisiana	1965	348	60	7	415	2000	288	3	22	313	364	-102
Maine	1898	272	13	974	1259	2293	237	26	1089	1352	1305.5	93
Maryland	3123	390	118	247	755	3583	210	63	122	395	575	-360
Massachusettes	1629	145	61	3141	3347	1584	121	75	5931	6127	4737	2780
Michigan	11536	620	14	8135	8769	12490	532	5	5558	6095	7432	-2674
Minnesota	8222	243	137	91	471	8900	264	16	133	413	442	-58
Mississippi	1550	66	0	90	156	1411	79	0	38	117	136.5	-39
Missouri	2667	435	1	1753	2189	2692	417	8	1693	2118	2153.5	-71
Montana	1882	85	241	3252	3578	1950	156	332	3170	3658	3618	80
Nebraska	1403	210	0	141	351	1340	170	0	113	283	317	-68
Nevada	675	32	19	490	541	*675*	85	5	364	454	497.5	-87
New Hampshire	2071	279	13	2260	2552	2144	190	20	2025	2235	2393.5	-317
New Jersey	4740	220	18	16861	17099	4712	205	9	20552	20766	18932.5	3667
New Mexico	1266	78	13	151	242	1376	128	10	269	407	324.5	165
New York	9129	191	134	1722	2047	10740	107	110	2003	2220	2133.5	173
North Carolina	8244	218	9	21526	21753	8262	185	63	23438	23686	22719.5	1933
North Dakota	604	70	6	147	223	586	46	13	147	206	214.5	-17
N. Mariana Is.	3	0	0	0	0	43	0	0	0	0	0	0
Ohio	6193	1772	281	14841	16894	6137	1559	278	9956	11793	14343.5	-5101
Oklahoma	1672	312	153	319	784	1693	316	106	451	873	828.5	89
Oregon	2630	253	291	3813	4357	2719	214	248	3595	4057	4207	-300
Pennsylvania	10249	437	122	9840	10399	10600	252	63	7211	7526	8962.5	-2873
Puerto Rico	489	1091	351	2980	4422	486	972	400	3766	5138	4780	716
Rhode Island	451	43	2	12	57	*451*	23	0	19	42	49.5	-15
South Carolina	1526	63	36	289	388	1569	117	28	271	416	402	28
South Dakota	751	188	19	1349	1556	756	134	21	623	778	1167	-778
Tennesee	1059	44	261	424	729	1145	64	159	293	516	622.5	-213
Texas	6658	454	53	848	1355	6757	398	41	796	1235	1295	-120
Utah	963	97	0	1491	1588	*963*	138	11	3378	3527	2557.5	1939
Vermont	1270	139	23	472	634	1426	74	30	426	530	582	-104
Virgin Islands	305	106	0	110	216	460	80	0	46	126	171	-90
Virginia	4241	215	4	601	820	4145	136	82	372	590	705	-230
Washington	4184	745	242	1335	2322	4204	658	185	1671	2514	2418	192
West Virginia	1374	121	38	2618	2777	1501	116	25	1000	1141	1959	-1636
Wisconsin	11895	747	4	5526	6277	11895	609	6	3867	4482	5379.5	-1795
Wyoming	707	51	7	739	797	800	70	48	439	557	677	-240
TRIBAL PWSs	920	79	22	766	867	930	138	10	884	1032	949.5	165
TOTALS	167156				168823	172821				165891	167357	-3097

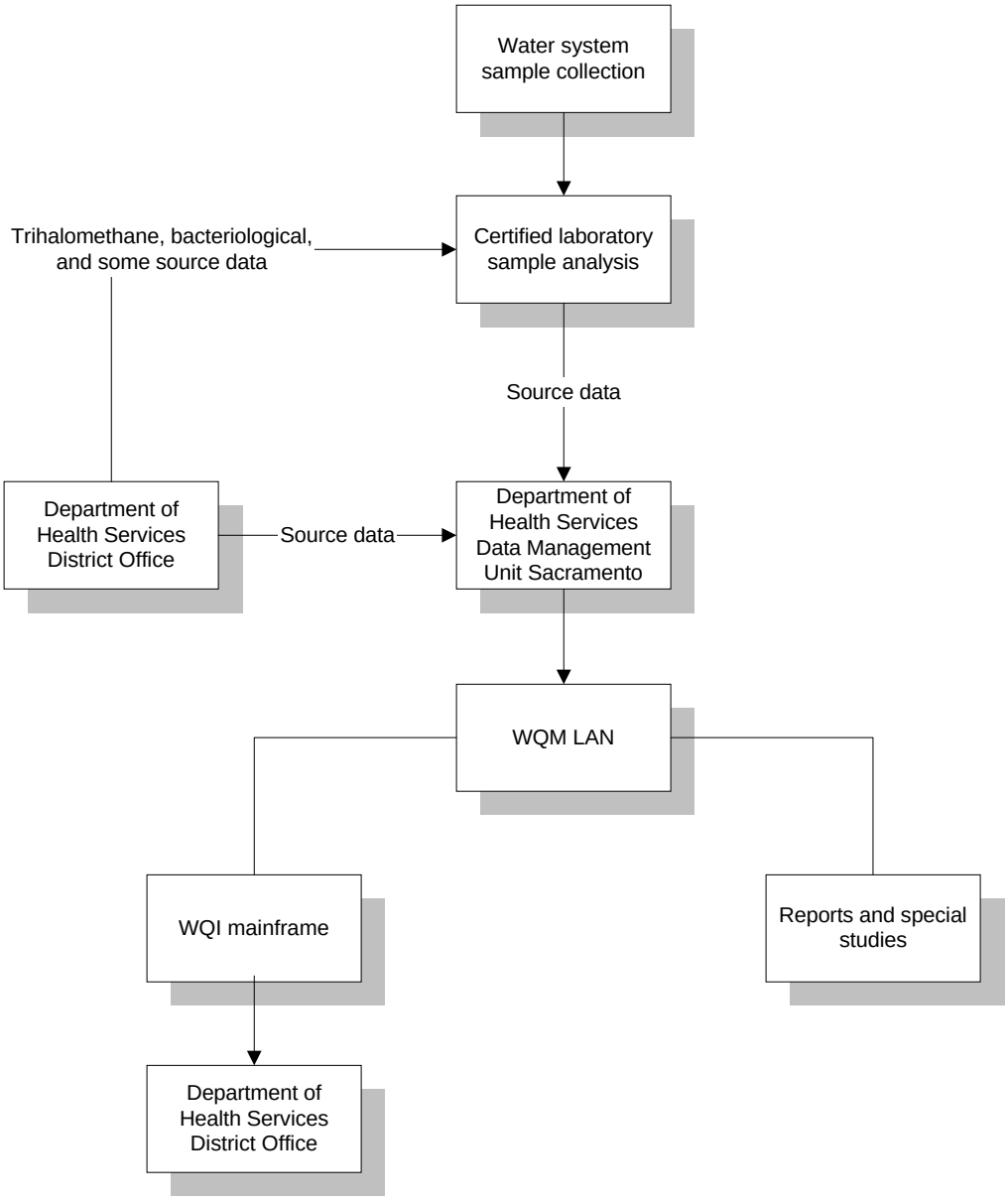
Appendix B
Missouri Data Flow Diagram

Figure B-1. Missouri Data Flow Diagram



Appendix C
California Data Flow Diagram

Figure C-1. California Data Flow Diagram



Note: WQM is the water quality monitoring database and WQI is the WQM mainframe companion of WQM.

Appendix D
Arizona Monitoring Schedule

Table D-1. Arizona Drinking Water Monitoring Schedule
Basic Requirements

Appendix E
Abbreviations

ASDWA	Association of State Drinking Water Administrators
CATS	Compliance Action Tracking System
CFR	Code of Federal Regulations
CTS	Compliance Tracking System
CWS	community water system
DI	direct implementation
DTF	data transfer file
EDT	electronic data transfer
EIIP	Emission Inventory Improvement Program
EPA	Environmental Protection Agency
FETS	Formal Enforcement Tracking System
FOIA	Freedom of Information Act
FTP	file transfer protocol
GPRA	Government Performance Requirement Act
HQ	headquarters
LAN	local area network
LIMS	laboratory information management system
LMI	Logistics Management Institute
MCL	maximum contaminant level
NCC	National Computer Center
NELAC	National Environmental Laboratory Accreditation Conference
NOV	Notice of Violation
ODBC	open database connectivity
OECA	Office of Compliance and Enforcement Assurance
OGWDW	Office of Ground Water and Drinking Water
PSL	principal state laboratories
PWS	public water systems
PWSS	Public Water System Supervision

QA/QC	quality assurance and quality control
RTP	Research Triangle Park
SDWA	Safe Drinking Water Act
SDWIS/FED	Safe Drinking Water Information System/Federal
SDWIS/STATE	Safe Drinking Water Information System/State
SNC	significant non-compliance
SOP	standard operating procedure
TCR	total coliform rule
TRI	Toxic Release Inventory
XML	extensible mark-up language

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13. ABSTRACT ***(Maximum 200 words)***

The U.S. Environmental Protection Agency (EPA) seeks to improve its operating procedures and reduce the reporting burden of the regulated community. The EPA is committed to implementing electronic reporting mechanisms, including electronic commerce (EC), electronic data interchange (EDI), and Web-based forms, as a means of streamlining compliance reporting. By using EC and EDI, reporting organizations, state and local environmental agencies, and the EPA can reduce the costs of compliance reporting, improve data quality, integrate the data across systems, improve data access, and eliminate processing delays.

This report documents the current business process analysis for reporting under the Public Water System Supervision program. This analysis will be the framework for the central receiving model in the "to be" environment.

14. SUBJECT TERMS

Business Process Analysis, electronic reporting, Environmental Protection Agency, Public Water System Supervision.

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